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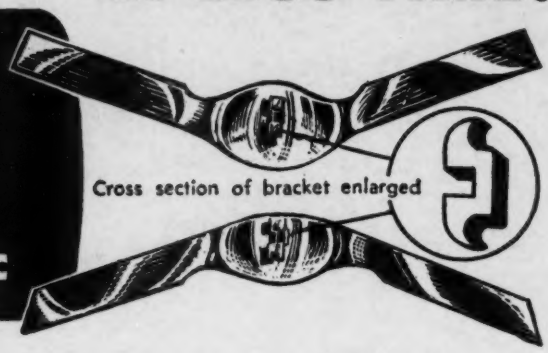

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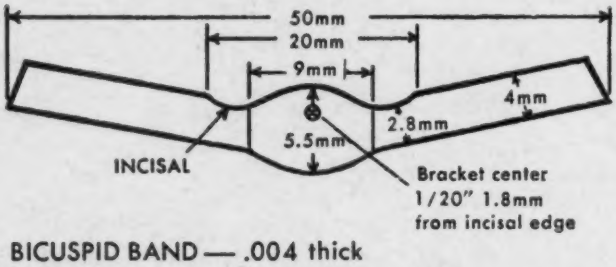

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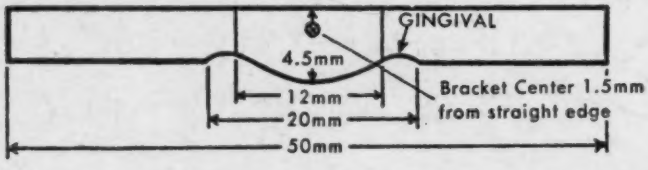

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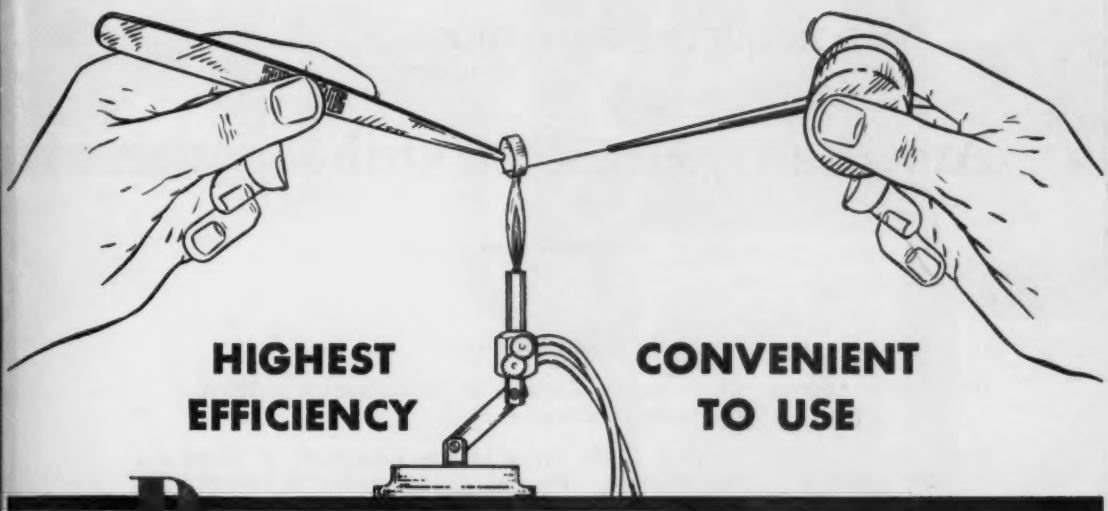
Feb



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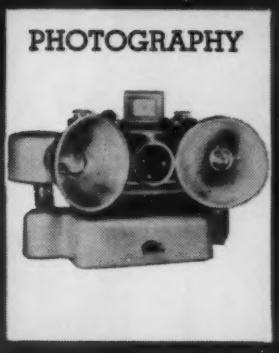

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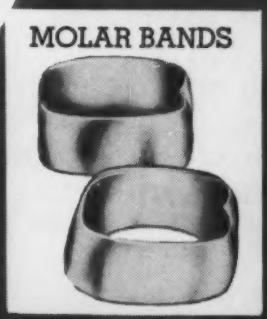

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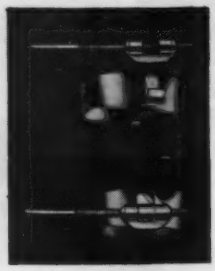

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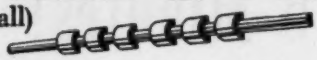

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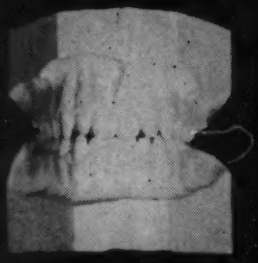

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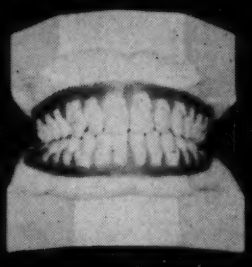

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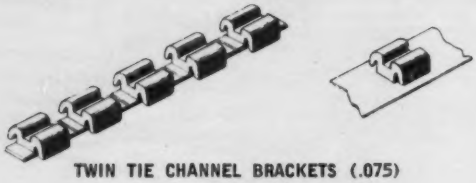

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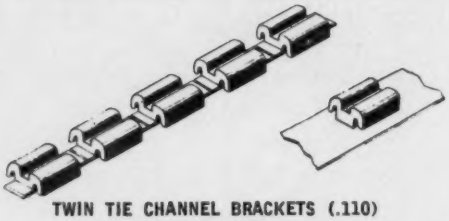

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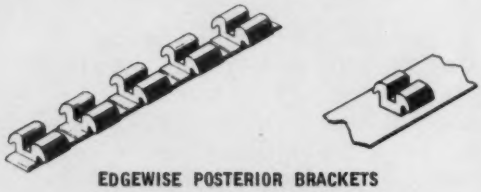

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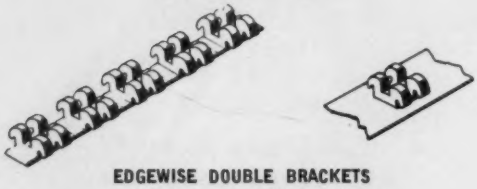

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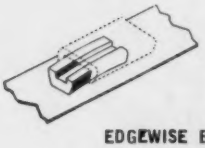

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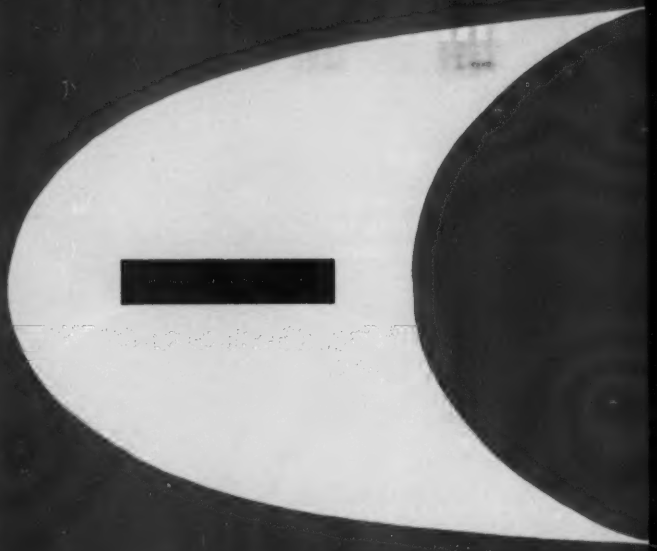

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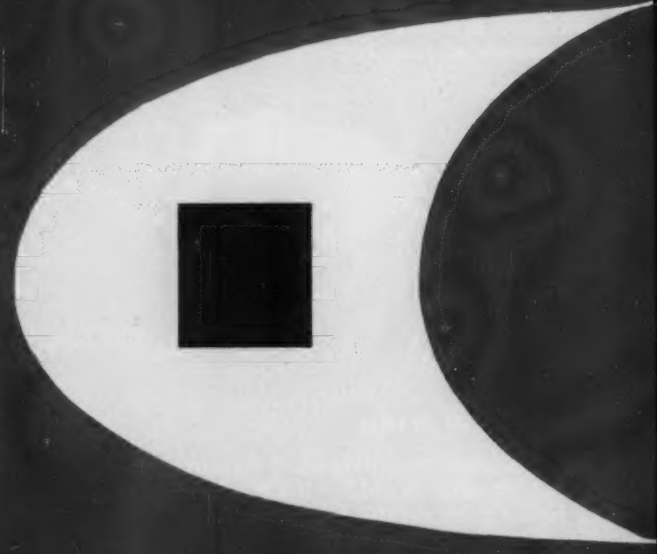

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American Journal
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VOL. 43 FEBRUARY, 1957 NO. 2

Original Articles

PRESIDENT'S ADDRESS, GREAT LAKES SOCIETY OF ORTHODONTISTS

MILTON R. CULBERT, D.D.S., TORONTO, ONTARIO

AS WE open this twenty-seventh annual meeting of the Great Lakes Society of Orthodontists here in Ottawa, on the northeastern fringe of our large territory, it is most gratifying to note that registration figures already indicate that we will have another very large attendance this year. Considering that registration figures have been consistently excellent throughout the history of the Society, and that the average member spends some twenty hours in lectures and clinics during the two and one-half days of each meeting, it will be obvious to anyone that this zeal to broaden our knowledge, to keep pace with research, and to develop finer techniques results directly in better care for the public.

Of course, all vocations are organized into societies, associations, guilds, unions, or whatever their members choose to call them. All these organizations hold conventions to deliberate on matters of mutual interest. While some may regard a trade union and a professional guild as poles apart, they are essentially the same, in that they are a banding together of workers of a calling. Although in that respect they are the same, a comparison between a professional society and a trade union reveals a startling and an all-important difference. The professional man devotes the major part of his time at his society's meetings to studying ways and means of improving his knowledge, his skill, and his services. The trade unionist, on the other hand, devotes his time at meetings to studying ways and means of improving his income and his personal benefits.

Read before the Great Lakes Society of Orthodontists, Ottawa, Canada, Oct 8, 1956.

What are the results of this fundamental difference? In recent years the trade unionist has gained a position of high privilege and freedom from responsibility, with sick benefits, vacation with pay, etc., and now pensions. Meanwhile, the professional man, too preoccupied with his quest for skill to bother about his financial position, has seen those of lesser skills and lesser responsibilities leaving him far behind in those areas.

At this point someone always likes to remind us that the professional man is high on the income scale and therefore should never have the bad grace to complain. But the statistics do not disclose the ugly facts that the professional man is paying much higher income taxes than people in industry earning comparable incomes, and that he works much longer hours for that dubious privilege.

To illustrate this, let us consider the position of the dentist in the economy of today. We will take the Canadian dentist as our example, because we are better acquainted with the figures on this side of the border. American members will note the similarities and differences with more than passing interest when they realize that the revenue departments of this country, the United States, and Great Britain have developed the profitable custom of studying one another's taxation gimmicks. As international borders are no barriers to these gimmicks, some of ours may creep into your tax system, and some of yours in turn may creep into ours.

The dentist begins his career with many thousands of dollars' worth of mental machinery which he can neither capitalize nor depreciate. He conditions himself to work long, tedious hours in a stance that would kill an ordinary workman, under tension that would wreck an average executive, and in quarters that would induce claustrophobia in many normal persons. As his own two hands earn his income, that income ceases abruptly the moment that he gets sick but his expenses carry on. At his death the most valuable asset that he has carefully built up over the years, his good will, perishes with him.

What does the government do to encourage him to carry on and to serve humanity, and to guide his son into his useful footsteps while the country is so desperately short of dentists? Let us look at some figures and find out. Let us say that the dentist is earning the average income for Canada of under $8,000.00 per year. Compare his tax situation with that of his businessman brother who is earning exactly the same amount. The brother has the right to deduct his annual maximum pension plan payment of $1,500.00 from his taxable income. The dentist is denied that right. Thus, the dentist not only pays $300.00 extra tax on the nondeductible $1,500.00, but in order to buy into a pension plan to reach financial parity with his brother, he must earn an equivalent additional amount which would cost him well over another $300.00 in taxes every year. So, in reality, our dentist is out over $600.00 more than his businessman brother on this one item alone. If the brother runs his own business as the dentist does, he has, in addition, an elastic expense account that permits him to charge off business promotion, business travel, and many other business comforts. The dentist's expenses are restricted to his bare office overhead.

Conscientious dentists who toil overtime hours to oblige extra patients net very little reward from such effort, as the extra dollars of income are subjected to bigger tax bites.

Two years ago a Canadian physician's claim for convention expenses was rejected by the tax department as excessive. On the subsequent appeal, the tax department endeavored to justify its stand, in part, on the ground that the government had made no specific regulation on allowances for convention expenses for professional men. As a result, it denied *all* the professional men their right to convention expenses from that time forward. Following a storm of protest, the government granted expenses for two conventions in Canada only. Further protests from our associations have recently won another concession, and now Canadians can claim expenses for two meetings per year anywhere. However, even concerning conventions, there is still injustice; for example, teachers in our professional colleges still cannot deduct one cent of the cost of attending meetings. They still cannot deduct one cent for the purchase of books that they must have to do their job. With 20,000 more professors required to meet this country's educational needs for the next decade, these are some samples of the myopic and idiotic lack of policy for encouraging young people to enter the professions as practitioners and teachers.

Needless to say, every young citizen has the right to know the truth before entering a university, and any vocational guidance that omits this information is rendering a grave disservice to the youth.

Why do these preposterous injustices exist? The government has been aware of these conditions; it has been bombarded with briefs and petitions from our associations for years. But what politicians are going to consider a petition which represents a few hundred professional men and their votes, against the interests of large organized groups, such as trade unions, which represent several hundred thousand votes, especially if those voters may soon seek paid health plans? As a national health scheme may not be too far distant, the government has told us that we must be prepared to look after more people to handle the job. But what political party, during the acute housing shortage, would have the ideals, or the courage, to tell the tradesmen that they must work on Saturdays, or to tell the bricklayers that they must lay more than the minimum number of bricks per day?

In their idealism, the professions have been unaware of the need to arm themselves with bargaining power. If progress cannot be made by an enlightened government policy, it is obvious that the professions must so arm themselves. Surgeons, physicians, dentists, etc., cannot be replaced, unless they train their own replacements themselves in the universities. Their numbers may not amount to several hundred thousand, as in a trade union, for example, but their smaller numbers are counterbalanced by their indispensable importance. As the problems of the various groups are common, the professions could work in concert to obtain at least the same tax benefits as the trade unionist or the businessman where pensions are concerned.

If we fail to learn how to defend ourselves with the same weapons that are being used against us in this economic struggle, it is easy to predict the outcome. Not only will the cost of our services soar to the inflated level of other labor, but the continued tax discrimination against practitioners and teachers will further reduce our dwindling numbers to the point where health schemes will be impossible, and those in private practice will be physically incapable of handling more than a fraction of the multiplying population.

Unfortunately, the public has a very distorted and, therefore, unsympathetic picture of the professional man, and usually a very exaggerated estimate of the professional man's affluence. As the facts become publicized, recruitment will be affected to a much graver degree. Here, also, we must learn to defend ourselves. Since the war, officers of medical and dental organizations have found out and reported that a colossal job of public relations must be done which will necessitate the employment of experts of that field, at a cost which no present society budget can support.

Present-day conditions demand that our professional bodies devote time to the study of our own protection in order to cope with social, economic, and political pressures. According to the wording of our constitution, these tasks are the responsibilities of two committees—the Legislative Committee and the Public Relations Committee. Until now, their activities have been confined to our internal affairs, so it is obvious that their duties must soon be expanded. A component society's committees are better situated to study state and provincial matters than the parent continental body. These committees should be instructed to study external affairs affecting the status of the profession, to report these findings and their advice to the Society and to the American Association, and to recommend consultations and lectures from experts of those fields when necessary.

As we begin this twenty-seventh annual meeting, I wish to express my gratitude to the wonderful people who have been my teammates in the executive work and on the committees throughout the year. Their cheerful enthusiasm has made our preparations a pleasure rather than a task, and their reliability has been a constant inspiration. May you all enjoy a most pleasant and instructive 1956 convention.

73 Warren Rd.

SOME EFFECTS OF THE OCCLUSAL GUIDE PLANE IN THE TREATMENT OF CLASS II, DIVISION 1 MALOCCLUSIONS

A Cephalometric and Laminagraphic Study of Treated Cases

Charles G. Sleichter, Jr., D.D.S., M.S.,* Iowa City, Iowa

THE mechanical principles of the occlusal guide plane as used in this study have been described in detail.[1] Essentially, this orthodontic appliance consists of a mechanism designed to position a relatively retruded mandible forward into a more desirable esthetic and functional position. It provides for "a change in the structural relation of the oral cavity and aids in the establishment of a correct anteroposterior relation of the teeth and arches."[2] The appliance consists of the usual labiolingual 0.040 inch diameter gold arch wires provided with intermaxillary hooks for Class II elastics. In addition, a device is soldered to the maxillary lingual arch in such a manner as to preclude any attempt by the patient to close the mandible in other than a predetermined position anterior to the original occlusal position. Through the use of intermaxillary elastics and the maxillary lingual device, a forward position of the mandible in relation to its pretreatment position is maintained during rest position and occlusion (Fig. 1).

A precursor to this more specialized device was discussed by Kingsley in 1880.[3] Subsequently, various mechanisms designed for the purpose of positioning the mandible forward to an esthetically more favorable location have been described.

At this time, the occlusal guide plane and the Norwegian system of functional jaw orthopedics appear to be the most effective and most controversial methods of treating Class II, Division 1 malocclusions through attempted mandibular repositioning. The Norwegian system has been reported in detail.[4] Related studies of the action of the occlusal guide plane are being conducted in several areas but have not been formally published.[5]

The purpose of this study was to investigate certain effects of the occlusal guide plane in the treatment of Class II, Division 1 malocclusion and to illustrate possible changes in the dentofacial complex produced by this appliance.

Presented in part before the Rocky Mountain Society of Orthodontics, Denver, Colorado, October, 1954, and the University of Illinois Department of Orthodontia reunion meeting, 1955.

*Visiting lecturer, State University of Iowa, Department of Orthodontics, Iowa City, Iowa; formerly of National Institute of Dental Research, National Institutes of Health, Public Health Service, U. S. Department of Health, Education and Welfare, Bethesda, Maryland.

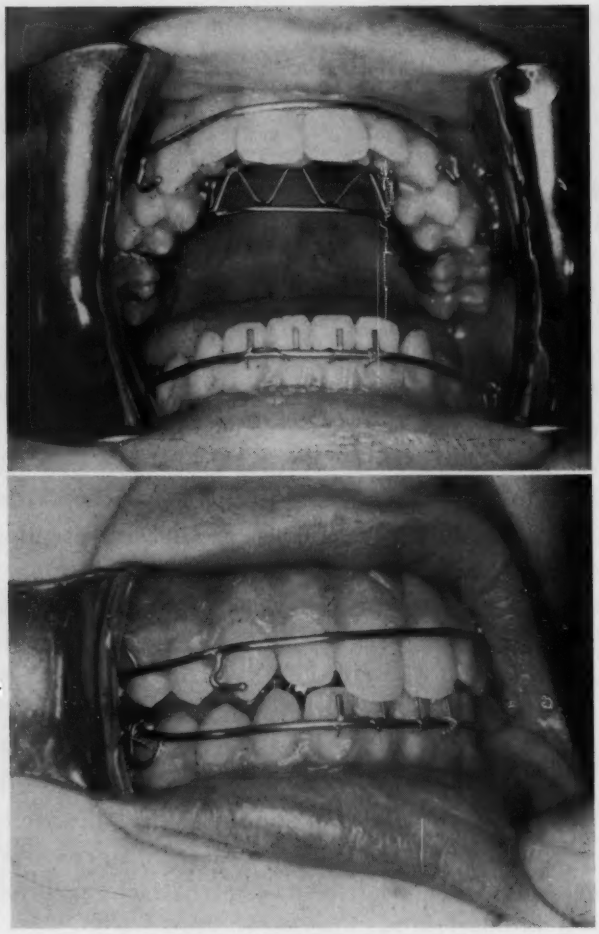

Fig. 1.—Occlusal guide plane appliance.

Fig. 2.—Facial type selected for this study.

METHODS AND MATERIAL

Nine subjects were selected for occlusal guide plane therapy. Qualifications for acceptance were: (1) Class II, Division 1 malocclusion (Fig. 2), (2) deep anterior overbite, (3) relatively good lower arch form, (4) age 6 through 14 years, and (5) an essentially negative physical examination.

Eight of the original nine subjects were available for observation for six months to one year after active treatment with the guide plane was discontinued. Five of these subjects were available for repeated observation two years after active treatment was concluded. The angle formed by the intersection of lines through points sella-nasion and nasion-pogonion (SNP) was used as a measure of relative mandibular prognathism (Fig. 3).

Each patient was subjected to a thorough physical examination before treatment. Preliminary cephalometric roentgenograms, positioned laminagrams of the temporomandibular joint, dental models, intraoral roentgenograms, and intraoral examinations were made for each patient.

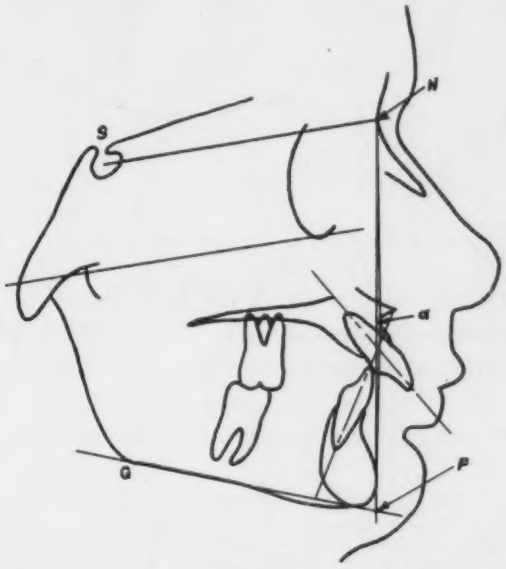

Fig. 3.—Points used to measure the various changes in the facial and dental pattern.

Several of the subjects were followed cephalometrically for one month or more before the occlusal guide plane was inserted. None of these showed any tendency for the dental relationship or the intermaxillary relationship to improve without mechanical therapy.

Dental models, cephalometric roentgenograms, and laminagrams were repeated as soon as a Class I molar relationship appeared to be definitely established and as indicated by patient progress. The "treatment time" in Table I indicates the time in which a Class I molar relationship was attained. Several of the subjects required continued therapy for correction of other details. All evaluations were made as soon as the patient could not occlude the teeth in a Class II position.

Data from tracings of serial cephalograms of four untreated subjects, age range 10 to 12 years each, with Class II, Division 1 malocclusions are included for comparative purposes.

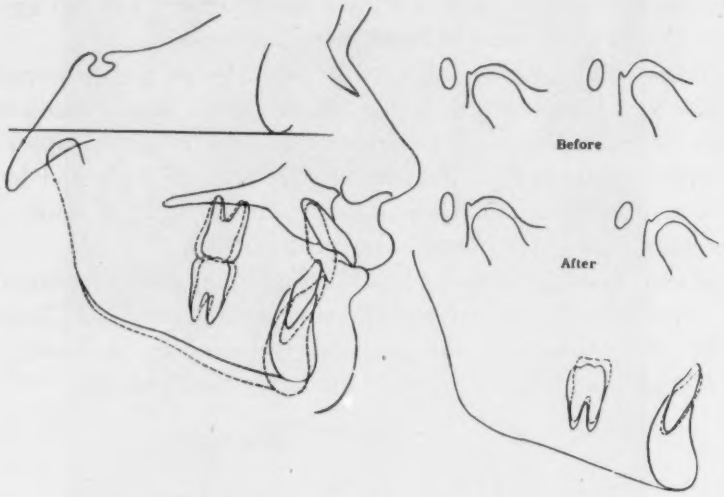

Fig. 4.

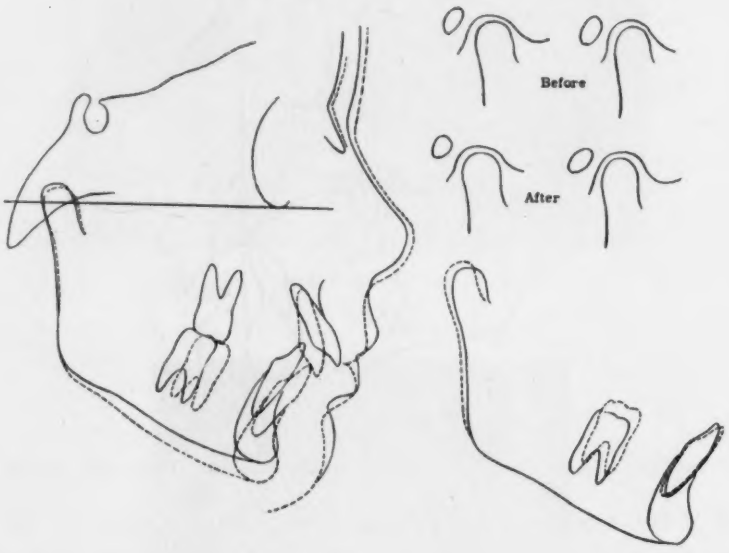

Fig. 5.

Figs. 4, 5, and 6.—Typical changes noted in a subject treated with the occlusal guide plane. Solid line = before treatment; stippled area = immediately after insertion of guide plane; dotted line = termination of active treatment.

Treated subjects were selected in order of referral to the National Institute of Dental Research Clinical Center from dentists in the vicinity of Bethesda, Maryland. The untreated subjects were selected from the Facial Growth Study, College of Dentistry, Department of Orthodontics, State University of Iowa.

Statistical tests were applied to the facial angle changes noted before treatment and six months to one year posttreatment.

FINDINGS

Response to treatment apparently varied in so far as areas of osseous growth were concerned. Grossly, several changes were always in evidence

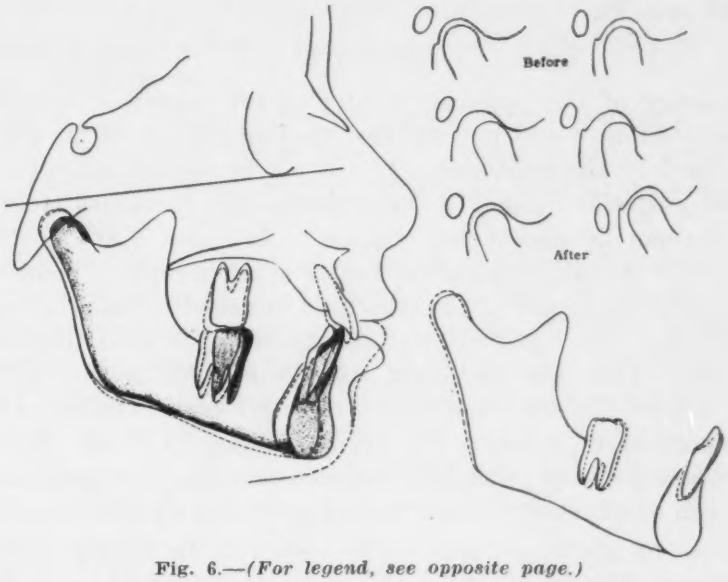

Fig. 6.—*(For legend, see opposite page.)*

(Figs. 4, 5, and 6; Tables I and II): (1) all molar relationships were corrected or considerably improved, several in an extremely short treatment time; (2) the laminagraphs show that the temporomandibular joint invariably tended to resume its integrity as therapy progressed; (3) the posterior border of the mandible always returned to approximately its pretreatment position.

TABLE I. TREATED CLASS II, DIVISION 1

SUBJECT	AGE	TREATMENT TIME (MONTHS)	OBSERVATION TIME (MONTHS)	CHANGE IN SNA
1. J. W.	10	4	20	0.0
2. M. T.	12	4	18	+1.0
3. I. S.	10	5	12	0.0
4. R. I.	14	6	16	+1.5
5. D. M.	14	7	19	+1.5
6. J. B.	10	4	15	+1.5
7. M. S.	11	5	28	+0.5
8. J. H.	8	5	20	+1.0

TABLE II. UNTREATED CLASS II, DIVISION 1

SUBJECT	AGE	OBSERVATION TIME (YEARS)	CHANGE IN SNA
1	10 to 14	2	+1.5°
2	10 to 14	2	0.0°
3	10 to 14	2	1.0°
4	10 to 14	2	0.0°

This is shown by the laminagraphic and cephalometric tracings. The anterior bony profile of the chin was affected in various ways (Figs. 4, 5, and 6). Statistically, there was a mean increase in the facial angle (SNP) of +0.845 degrees in the treated subjects, as compared to a mean difference of +0.625 degrees in the untreated subjects. This mean difference of 0.250 degrees between treated and untreated Class II subjects is not statistically significant (T = 0.60, Tables I and II).

DISCUSSION

The tendency of the posterior border of the mandible to return to its pretreatment position would indicate that the morphology of the glenoid fossa was not changed by the treatment. This is not surprising, since the condylar cartilage and posterior border of the mandible are the areas more likely to respond to changes in mandibular position.[6] In Cases 5 and 6 the position of the chin point was slightly forward after short periods of treatment, even though the posterior border of the mandible returned to its original position. It is unlikely that this rapid skeletal change could be attributed entirely to normal growth. This increase is not significant when measuring the angle (SNP), but is more obvious when the tracings are superimposed on S and line SN and the position of P before and after treatment is noted. Interestingly, several investigators have published evidence that condylar growth and mandibular size can be affected through the influence of orthodontic appliances.[7, 8]

Movements of the upper and lower incisor teeth during treatment are self-explanatory. The relationship of lower face height (AP) to the sum of the middle and lower face height (NP) before and after treatment is varied during treatment. In the light of previous investigations demonstrating the constancy of the ratio of lower face height to total face height,[9] it seems probable that this ratio will eventually resume the pretreatment ratio. Tracings of the individual cases illustrate the relative changes better than description (Figs. 4, 5, and 6). The cephalometric x-ray pictures of the five subjects observed two years after active treatment revealed that the facial growth trends were similar to those found in the same subjects the previous year.

The number of treated cases, as well as the control group, is small. Obviously, it is difficult to obtain controlled data on large numbers of treated patients. Similarly, records of untreated Class II malocclusions are scarce since most parents seek treatment as soon as the deviation from the ideal is pointed out to them.

The insignificant change in the angle SNP statistically would certainly indicate that clinically noticeable changes would be even less obvious.

The data obtained from this study support the contention that orthodontic therapy, as practiced at the present time, is not capable of effective stimulation of condylar growth.

The gratifying results of treatment are more likely due to changes in position of the teeth and possibly the alveolar bone than changes in the facioskeletal pattern.

SUMMARY

Eight children were treated with the occlusal guide plane appliance. Several changes were consistently noted: (1) the posterior border of the mandible invariably returned to approximately its pretreatment position, (2) molar relationships were always changed from a Class II to a Class I occlusion in a short period of time, (3) the head of the condyle tended to return to a location comparable to the pretreatment position in every case, and (4) relative mandibular prognathism was not increased statistically or clinically by this method of treatment.

This study is not intended for the purpose of propagating a particular appliance. The treatment periods listed do not necessarily denote a finished orthodontic result; however, several cases were treated to an acceptable occlusion in less than six months.

One may speculate that anterior development of the mandible may have been slightly stimulated in several cases. The lack of anterior development of the mandible in the remaining cases suggests that very desirable results can be produced in selected patients, even though skeletal proportions are not changed. Future investigations on laboratory animals may provide more concrete evidence for the basis of final conclusions.

The cooperation and assistance of Drs. E. Hixon, R. Lloyd, H. Meredith, O. Oliver, W. Oliver, E. Lundsford, and H. Terry have contributed greatly to the collection of these data.

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SOME CLINICAL APPLICATIONS OF THE MODIFIED JOHNSON TWIN ARCH WIRE TECHNIQUE

FAUSTIN N. WEBER, D.D.S., M.S.,* MEMPHIS, TENN.

THE findings of Germond,[1] as published in his paper, entitled "A Survey of Current Practice Procedures," reveal that the appliance technique most extensively used by the members of the Southern Society of Orthodontists is that developed by Dr. Joseph E. Johnson of Louisville, Kentucky—the so-called Johnson twin arch wire technique.

Germond's information came from the returns of fifty-five questionnaires which he sent to members of our sectional Society. His sample was large enough to be acceptable and did have the merit of including five different groups of orthodontists, classified according to their years in practice.

In the "years in practice" classification, the Johnson twin arch appliance was the mechanism of choice with all but one group, namely, those orthodontists who had been in practice for a period of from ten to fifteen years. In this group 36 per cent used the labiolingual technique, while 30 per cent used the twin arch technique.

The group percentages, derived from the fifty-five members of the Southern Society of Orthodontists responding to Germond's questionnaire, showed the following appliance preferences: combinations and removable appliances, 6.2 per cent; Universal appliance, 6.2 per cent; edgewise arch, 15.9 per cent; labiolingual, 28.3 per cent; and Johnson twin arch, 43.4 per cent.

Because of the extensive use of the Johnson twin arch appliance by the members of this Society, it would appear feasible to demonstrate some of the many modifications to which the appliance lends itself, modifications which render the appliance a more efficient mechanism with which to treat the so-called extraction case.

The basic technique as taught by Johnson and Madden is well known to many members of this Society because of the numerous scientific papers which these men have contributed to our orthodontic literature and the many short courses of instruction in the twin arch wire technique which they have given. The use of the appliance, as it is to be described in this article, is vastly different from that taught by Johnson and Madden; because of this, you may see some features of this technique which are new and, it is hoped, useful to you.

Presented before the Southern Society of Orthodontists, Aug. 21, 1956, White Sulphur Springs, West Virginia.

*Professor and head of Department of Orthodontics, University of Tennessee.

The appliance modifications that are to be presented were born of necessity. Because "necessity is the mother of invention," these modifications were developed when the twin arch wire technique was used with a different philosophy of treatment than that promulgated by Johnson.

In the modified twin arch wire technique, the high percentage of cases in which extraction of dental units is an integral part of treatment necessitated (1) a more efficient method of moving canine teeth distally, (2) augmentation of intraoral anchorage, and (3) more effective control of the positions of the mandibular incisors, and the maxillary and mandibular premolars.

An explanation of how these three objectives were attained will also reveal the chief areas of difference between the modified twin arch wire technique and the twin arch wire technique advocated by Johnson.

DISTAL MOVEMENT OF CANINES

In the modified twin arch wire technique, following the removal of first premolars, the maxillary and mandibular canines are moved posteriorly with sectional arch wires. These sectional appliances are fabricated from the regular end tubing material into which has been drawn a ribbon-shaped wire rather than the usual twin wires. This flat ribbon wire is 0.010 by 0.020 inch. It is a wire form that is especially adapted to use in a sectional appliance. Because of its shape, it resists distortion on its wide dimension. This makes it possible to lock the ribbon portion of the sectional arch wire in the Johnson attachment on the canine teeth and move them posteriorly with a minimum amount of mesiodistal tipping.

There are three different methods that may be employed to activate the sectional arch wires in the distal movement of the canines: (1) compression of coil spring sections, (2) extension of coil spring sections, and (3) use of rubber elastics.

Whether the coil spring sections are used as an extended or compressed type, they are fabricated from hard-temper chrome steel alloy wire that is 0.009 inch in diameter.

In making the coil springs, if a 0.032 inch wire core is used to form the wire around, the lumen of the finished spring will closely approximate the outside diameter of the tubular material upon which it fits. A close fit of the spring, yet one that allows it to slip freely on the end tube, is desirable.

When used as a compressed spring fitted over the end tube of the sectional appliance, the coil spring is activated by wrapping several turns of steel ligature wire around the end tubing just in front of the spring section and then drawing this ligature against the anterior end of the spring. The spring thus compressed is maintained in this state by securing the ligature around the distal end of the horizontal buccal tube on the molar band. To prevent the compressed coil spring from coming into contact with the mesial end of the buccal tube on the molar band, a stop is formed in the end tubing 4 to 5 mm.

in front of the mesial end of the buccal tube. With such an appliance set-up, when the coil spring is compressed on the end tube by drawing the ligature tight between the anterior end of the spring and the molar buccal tube, a pull force is developed on the sectional arch wire. If the ribbon wire portion of the sectional arch wire is bent at its anterior end so that it cannot slide through the Johnson attachment on the canine band, this pull force will be transmitted to the canine tooth and will effect its posterior movement.

As the canine moves posteriorly, the stop on the sectional arch wire will ultimately make contact with the molar buccal tube. When this point is reached, no further movement of the canine is possible and it is necessary to remake the sectional appliance so that the stop again may be located several millimeters in front of the buccal tube.

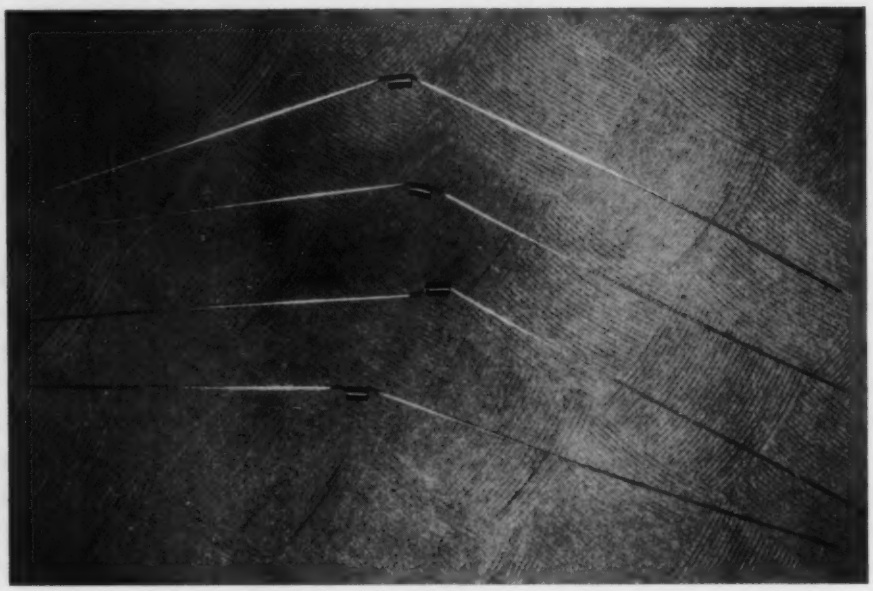

Fig. 1.—Contraction coil springs. These auxiliaries may be used to activate sectional arch wires. They are formed on a special jig. The springs are fabricated from 0.009 inch hard-temper chrome steel wire. There are about ten turns of wire in the tightly wound coil.

Another method of using coil springs to activate sectional arch wires in the posterior movements of canines is employed. In the method to be described, a tightly wound coil is fabricated from 0.009 inch hard-temper steel wire having an inside diameter of approximately 0.035 inch. This coil, consisting of about ten turns of wire, is formed on a special spring-wrapping jig. When it is fabricated, two straight pieces of wire, several centimeters long, extend from the coil spring—one from the anterior and one from the posterior end of the spring (Fig. 1).

With the coiled portion of the spring fitted over the tubular part of the sectional appliance and located near the canine tooth (Fig. 2*A*), the straight section of wire coming from the anterior end of the spring is secured around that portion of the ribbon arch wire which extends through the mesial end

of the Johnson attachment on the canine band. The straight section of wire coming from the posterior end of the spring is fastened around the distal end of the buccal tube in such a manner that the tightly wound coils of wire in the coil spring are pulled open and the spring is activated (Fig. 2*B*).

Fig. 2*A*.

Fig. 2*B*.

Fig. 2*A*.—Contraction coil spring in place on the sectional appliance. The anterior end of the straight piece of wire extending from the spring is secured by wrapping it several turns around the ribbon wire portion of the sectional appliance just in front of the canine attachment; the posterior end is wrapped around a portion of end tubing that is allowed to project through the distal end of the buccal tube.

Fig. 2*B*.—Contraction coil spring in action. This auxiliary has been activated by pulling the tightly wound coil spring open and wrapping the straight wire sections of the spring around the anterior and posterior ends of the sectional appliance. If that portion of the auxiliary that is to be secured around the ends of the sectional arch wire is softened by heating, closely adapted ends of the coil spring are easy to acquire.

This is the so-called "pull coil" spring. Its use was suggested by Nagamoto,[2] who called it "a contraction coil spring." More recently, Dukes[3] applied it to the activation of sectional arch wires in the modified Johnson twin arch wire technique. After the tension of the initial adjustment has worked out

of the spring, it may be reactivated by grasping, with small-nosed pliers, that portion of the spring which is straight and extends distally to fasten around the molar buccal tube. A 45 degree angle bend is then placed in the wire. At least a second reactivation is possible by bending this straight wire additionally before it becomes necessary to replace the used coil spring section with a new one.

The third method of activating sectional arch wires for the posterior movement of canines involves the use of rubber elastics. In this application, a thin-walled latex rubber band is stretched from the anterior extent of the sectional arch wire as it protrudes from the Johnson attachment on the canine band to the posterior extent of the appliance, that is, the distal end of the molar buccal tube. The force emanating from the stretched, thin-walled, latex elastic is of a more gentle nature than that developed by the compressed or extended coil spring. However, all three auxiliaries are effective when used to activate sectional appliances for the posterior movement of canines. The only contraindication to the use of any of these auxiliaries that comes to mind is that concerning the rubber elastics. It is unwise to use elastics with the sectional appliances in the uncooperative or untrustworthy patient. For the rubber elastic activation of sectional arch wires to be effective, the patient must be depended upon to wear the elastics continuously and renew them regularly.

AUGMENTATION OF ANCHORAGE

The use of sectional arch wires in the distal movement of canines taxes the anchorage, and in those cases where minimal amounts of forward movement of the posterior teeth may be tolerated it is necessary to augment or reinforce the anchorage units.

A modification of the conventional maxillary lingual appliance has been helpful in augmenting anchorage in the upper denture. The lingual arch wire is contoured so that it dips into the anterior palatal vault. Onto the wire of this area, quick-curing acrylic is attached. The resultant appliance has a palatal button of acrylic that fits intimately against the vertical portion of the tissues of the anterior hard palate. Forward movement of the posterior teeth is resisted by the innate stability of these teeth augmented by the support given them through the contact of the palatal acrylic button against the dense fibrous gingival tissues of the anterior hard palate.

In the mandibular denture, anchorage reinforcement is affected by a conventional lingual arch wire that is closely adapted to the cervical portion of the lingual surfaces of the mandibular incisors. If this intraoral anchorage proves inadequate, it must be reinforced additionally by extraoral anchorage.

Various methods may be employed to adapt sectional arch wires to the use of extraoral anchorage. In the technique described here, double tubes are the means by which attachment is made between the intraoral and extraoral components of the appliance setup. Two round tubes, the type that are

usually soldered to the buccal surfaces of molar bands, are soldered together on their long axes. One of the tubes has an inside diameter of 0.036 inch; the other tube has an inside diameter of 0.050 inch (Fig. 3).

The tube with the 0.036 inch inside diameter is fitted over the tubular material of the sectional arch wire; the tube with the 0.050 inch inside diameter is the fixture that receives the labial wire and its attached outer bow which, along with the headgear or cervical strap, constitute the extraoral parts of the appliance (Figs. 4 and 6).

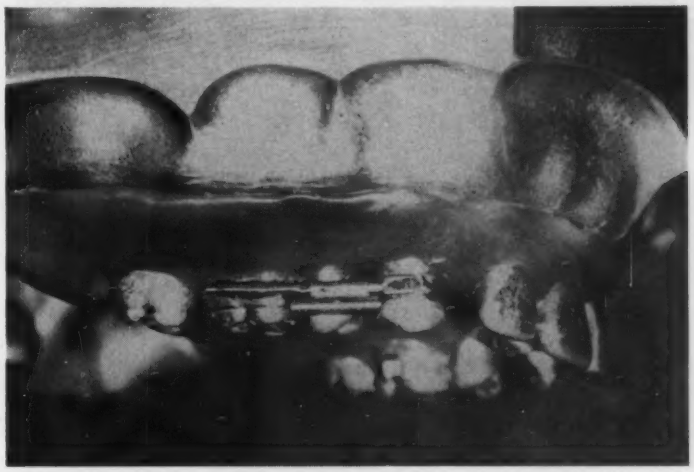

Fig. 3.—Double tubes on a sectional appliance. Two round tubes are soldered together on their long axes. The smaller tube (0.036 inch, inside diameter) is fitted over the tubular material of the sectional appliance. The larger tube (0.050 inch, inside diameter) is one of the fixtures into which the labial arch wire and its attached outer bow are fitted (Figs. 4 and 5). The end tubing material is collapsed immediately mesial and distal to the 0.036 inch tube. This is done to prevent the double tubes from sliding anteriorly or posteriorly on the sectional arch wire.

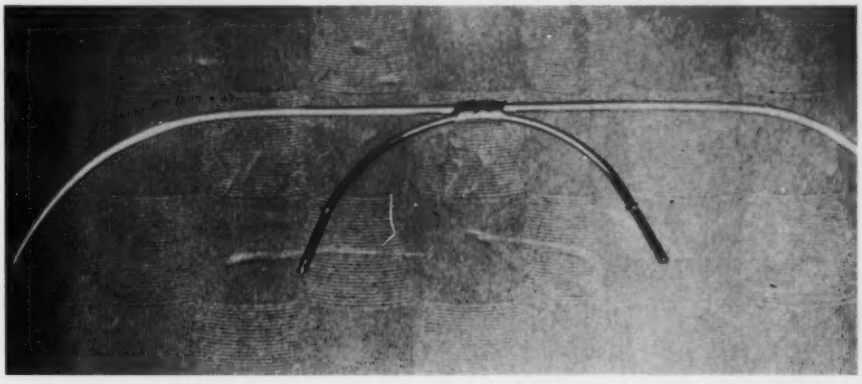

Fig. 4.—The 0.050 inch labial arch wire and outer bow. This appliance is attached to the sectional arch wires by means of the double tubes (Figs. 3 and 5). The most posterior ends of the outer bow are bent into hooks (not shown) to receive the cervical elastic strap. The outer bow is formed from 0.060 inch chrome steel alloy wire. Note the stops attached to the inner bow to regulate the position of the labial appliance in the double tubes.

The position of the double tubes in relation to sectional arch wires is stabilized by placing stops on the end tubes mesial and distal to the area occupied by the 0.036 inch tube. Fitting the labial wire with its attached

outer bow into the 0.050 inch set of tubes and attaching the headgear makes it possible to exert force against the canines (Fig. 5). By such a method, canines can be moved posteriorly without any strain on the posterior teeth. This is highly desirable and, indeed, a necessity in Class II four-premolar-extraction cases where the forward movement of the maxillary molars is to

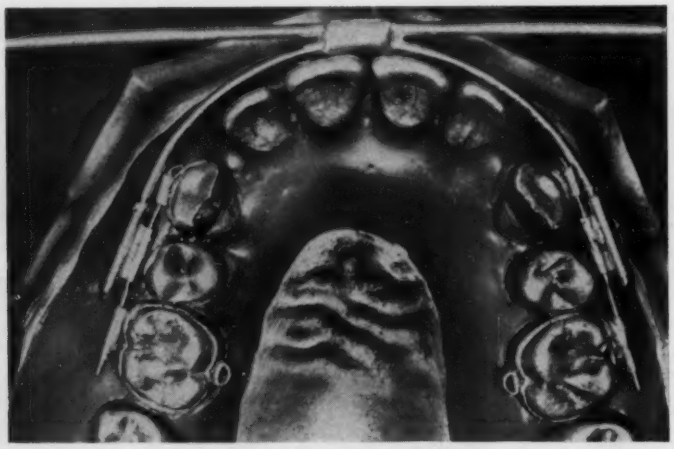

Fig. 5.—Inner and outer bow assembly in place. The 0.050 inch labial arch wire (inner bow) is fitted into the double tubes which are attached to the sectional arch wires. With stops placed so as to regulate the anteroposterior position of the inner bow and a cervical strap attached to the posterior end of the outer bow (Fig. 6), extraoral force may be applied to move the canines distally.

Fig. 6.—The outer bow and the cervical elastic strap. The relationship of the extraoral components of the appliance is shown. Observe the straight horizontal direction of the outer bow and the level at which the bow emerges from the lips.

be avoided. In the mandibular arch, extraoral force is recommended to move canines distally in those cases where arch length is so deficient that, subsequent to the extraction of the premolars, there is scarcely room enough to align the remaining teeth in stable positions.

After the canines have been moved posteriorly to the desired extent, there is still the possibility that augmentation of the intraoral anchorage units will be necessary. This is especially apparent in extreme bimaxillary protrusion cases when, following the retraction of the canines, the incisors are to be moved lingually with as little accompanying forward movement of the posterior teeth as possible or in the Class II four-premolar-extraction case when, following the retraction of the maxillary and mandibular anterior teeth a Class II occlusion persists. In instances such as these, and there are many others, extraoral anchorage may be employed to good advantage.

Two different types of extraoral anchorage are used; one is cervically derived and the other is occipitocervically obtained. As mentioned previously, the heavy labial arch wire that fits into the pair of 0.050 inch tubes that are attached to the sectional arch wires has an outer bow component. This outer bow makes it possible to employ a cervical elastic strap. The strap is attached to the ends of the outer bow, and in this manner extraoral force that is of cervical origin is applied to the sectional arch wires.

Fig. 7.—Occipitocervical anchorage. The headgear shown is made from plastic tubing and plastic belting. The tubing is 0.5 inch in diameter. The belting is 0.75 inch in diameter. The occipital strap (not shown) runs in the sagittal plane from the tubing up to attach to the coronal strap. The occipital and coronal straps make it possible to regulate the level and cant of headgear hooks that emerge from the plastic tubing.

The occipitocervical anchorage is used whenever full rather than sectional arch wires are in place. The preferred headgear is the type described by Kanter.[4] This headgear is fabricated from plastic tubing and plastic belting. The plastic tubing, which is 0.5 inch in diameter, is heated and bent to fit the contour of the upper portion of the patient's neck. It is held in its proper horizontal plane by two plastic straps, one of which crosses the coronal portion

of the head transversely down onto the temporal area, passes in front of the ears, and is attached to the plastic tubing. The second plastic strap is joined to the first at its midsagittal point and passes downward and backward in the sagittal plane over the occipital portion of the head to attach to the plastic tubing. The headgear thus fashioned utilizes cervical and occipital areas to resist the force directed upon it (Fig. 7).

The outer parts of the headgear are the rubber elastic and the headgear hooks. One headgear hook is attached to the rubber elastic, the elastic, in turn, is threaded through the plastic tubing and the second headgear hook is then secured to it. The headgear hooks are fabricated from 0.050 inch chrome steel wire and are so designed that they cannot turn over within the plastic tubing or be pulled back through the tubing when disengaged from their connection with the intraoral appliance. Different amounts of pressure may be exerted on the teeth with this headgear by varying the length of rubber elastic used within the tubing. The elastics are 0.25 inch in width and vary in length from 7 to 10 inches.

A headgear such as the one just described, fitted with coronal and occipital straps, is preferred in any situation where the direction of the pull must be controlled to the cervical gear which offers little opportunity for controlling the direction of pull. In the anterior open-bite malocclusion or in the deep vertical overbite case, the desirability of changing the headgear's direction of pull against the anterior teeth is obvious.

CONTROL OF INCISORS AND PREMOLARS

In the treatment of those malocclusions in which the removal of dental units is necessary, special demands are placed upon the orthodontist which tax his clinical capabilities and severely test the versatility of the orthodontic mechanism of his choice.

Contrary to the belief of many, extraction cases as a group are more difficult to treat correctly than are most nonextraction cases. This is so because more tooth movement, and a more difficult type of movement, is demanded in the extraction case that is treated correctly than is demanded in the treatment of the average nonextraction case.

The necessity of leaving the roots of the teeth mesial and distal to the extraction area parallel calls for exacting control of the premolars as well as the canines. This fact, coupled with the treatment requirement of leveling the mandibular occlusal plane, revealed the apparent need for using bands on the premolars and mandibular incisors.

In the treatment of extraction cases by a modified Johnson twin arch wire technique, the mandibular premolars are banded, using preformed bands that are fitted with twin-tie attachments. These attachments will accommodate wires from 0.016 to 0.036 inch in diameter. The 0.016 inch arch wire is used in the mandibular arch following the retraction of the canines. When this stage of treatment has been reached, there will be spaces between the mandibular incisors. At this time fitting and cementing of the incisor bands are simplified.

With all the teeth from mandibular first molar to first molar banded, successively heavier arch wires are used beginning with the twin wire and advancing through 0.016, 0.018, 0.20, and 0.022 inch round wires.

To make the 0.016 inch wire fit the lumen of the buccal tubes that are soldered to the molar bands, the ends of the wire are bent completely upon themselves. The 0.016 inch arch wire thus presents two end sections that are slightly more than 0.032 inch in diameter. These end pieces fit with reasonably close tolerance into the molar buccal tubes which have an inside diameter of 0.036 inch. The 0.018, 0.020, and 0.022 inch arch wires are soldered or welded to the regular tubular material that conventionally forms the end tubing of the twin arch wire.

Leveling the occlusal plane, rotating premolars, and controlling their axial relationships are facilitated when bands are attached to all the teeth from first molar to first molar. There are other treatment advantages acquired with this appliance setup. For one thing, it enables the operator to discontinue the use of the mandibular lingual arch wire whenever he chooses (this is safe if the labial appliance is fabricated from 0.016, 0.018, 0.020, or 0.022 inch wire). The 0.020 and 0.022 inch wire can be made to embody other features, such as closing loops and tip-back or second order bends. Arch wires of this size are strong enough to carry headgear hooks for the use of extraoral anchorage and permit the attachment of hooks at any desired point to be used for attaching open-bite, inter-, or intramaxillary elastics. Closing loops can be used in the 0.020 or 0.022 inch arch wires. These closing loops make space-closing a relatively simple procedure.

An additional advantage of using the 0.020 or 0.022 inch arch wire in the mandibular arch is that several useful auxiliary attachments are adaptable to these heavier arch wires, namely, uprighting springs and rotating levers. The uprighting spring is useful in correcting the mesiodistal axial inclination of teeth and, as such, finds a frequent application in uprighting canines that have been tipped as they were moved distally. The uprighting spring, like the rotating lever, is fabricated from 0.022 inch round wire (precious metal or chrome steel alloys are used).

If the uprighting spring is used on canine teeth, it is attached to the cap on the canine band. From the point on the cap where it is soldered or welded, the spring wire extends distally for several millimeters before it is bent into a safety-pin loop. From the loop, the wire extends further distally to a point where its hooked end fastens to the labial arch wire. The passive position of the uprighting spring is either above or below the horizontal level of the labial arch wire over which it is hooked. Whether the spring is to be activated by pulling it up or down depends upon whether the uprighting spring is being used to tip the tooth mesially or distally.

The rotating lever is a straight piece of 0.022 inch wire, one end of which fits into the upper or lower channel of the twin-tie attachment on the rotated tooth; the other end is formed into a hook that fastens to the labial arch wire when the rotating lever is put into action.

The uprighting spring is used most frequently on canine teeth, while the rotating lever finds its most usual indication on premolars. To make both auxiliaries more efficient, they are heat-treated before being inserted in the mouth. The chrome alloy wires are oven-heated to temperatures ranging between 750 and 850° F. When this range of heat has been attained, it is

Fig. 8*A*.

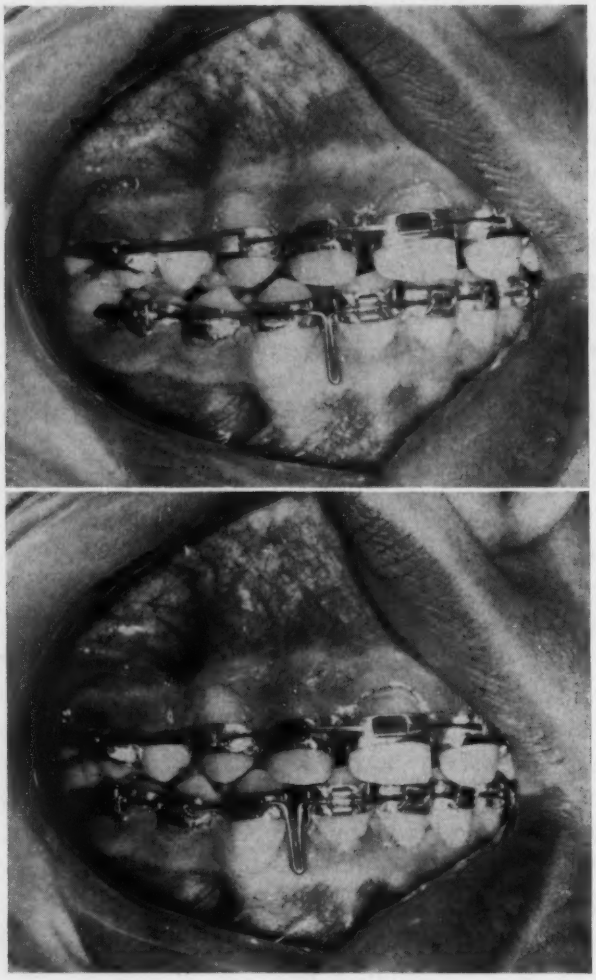

Fig. 8*B*.

Fig. 8*A*.—The labial appliance with closing loops. After mandibular canines are positioned posteriorly, the incisors may be tipped lingually with the appliance shown. A 0.022 inch chrome steel alloy wire is secured in the end tubing in place of the twin wires. Closing loops are bent in the arch wire distal to the brackets on the lateral incisors.

Fig. 8*B*.—The closing loops activated. The loop has been pulled open by tying the arch wire back to the mandibular molar. The arch wire is then secured in the attachments on the canine and premolar bands. To make the appliance most effective, it should be heat-treated before it is placed in the mouth.

maintained for a minimum of three minutes. Additional benefit may be derived by leaving the chrome alloy wire in the heat-treating oven for a longer period of time; however, maximum improvement is acquired after a ten-minute heat-treating period has supervened. If the wire to be heat-treated

is a precious metal alloy, it is oven-heated slowly to 840° F. and allowed to cool over a fifteen-minute period down to 480° F.

It is distinctly advantageous to heat-treat the labial appliance that has closing loops formed in it. This arch wire is formed from 0.022 inch chrome alloy wire and is used in the modified Johnson twin arch wire technique to tip mandibular incisors lingually. As such, the appliance is designed with the closing loops mesial to the canine teeth (Fig. 8). If the closing loops are bent in the arch wire mesial to the first molars, these teeth can be moved anteriorly by the action of the loop auxiliary. To have this appliance efficiently perform its task of closing spaces, it is advisable to heat-treat it.

The heat-treating operations are quickly and easily performed in a small oven that is equipped with a pyrometer.

There may be treatment circumstances where the forward movement of molar teeth is desirable. This is usually the situation when second premolars are the mandibular teeth that are removed in four-premolar-extraction cases. The indication for removal of lower second premolars in preference to lower first premolars is to be found in the malocclusion where the following characteristics are found:

1. Mild crowding of mandibular anterior teeth.
2. Class II molar occlusion.
3. Larger than average first premolars with well-developed lingual cusps.

In treating malocclusions with these characteristics, only a slight posterior shifting of the mandibular anterior teeth is desirable or necessary. This means that the greatest amount of the extraction space will be closed by moving the molar forward. This, in turn, will effect the desired change in the molar occlusion. In order to move the molar forward and at the same time keep its axial relationship vertical, an auxiliary is needed that prevents the tooth from tipping as it is moved anteriorly or is capable of uprighting it after it has tipped; such an auxiliary is the Bull loop bent into the labial appliance. In the use described, the loop would be formed in the arch wire just distal to the bracket on the first premolar. The ends of the labial appliance that fit into the molar buccal tubes are then formed with tip-back bends to keep the apical portions of the molar roots moving forward as fast as their crown portions.

The 0.020 or 0.022 inch mandibular labial appliance, when used in conjunction with bands on all the teeth from molar to molar, furnishes an attachment medium for headgear hooks and provides efficient anchorage for rubber elastics in the treatment of Class I, II, or III malocclusions.

SUMMARY

The Johnson twin arch appliance is an effective mechanism for treating the various types of malocclusion.

If used to treat the so-called extraction case, however, the appliance has certain deficiencies. These deficiencies are overcome, for the most part, when

(1) a more efficient method of moving canines distally is employed, (2) the intraoral anchorage is angmented by extraoral anchorage, and (3) the operator has more effective control over the positions of the mandibular incisors and the maxillary and mandibular premolars.

In the modified Johnson twin arch technique that has been described, several methods of overcoming these deficiencies have been outlined.

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847 MONROE.

AN ANALYSIS OF DENTOFACIAL RELATIONSHIPS

RICHARD A. RIEDEL, D.D.S., M.S.D., SEATTLE, WASH.

INTRODUCTION

ORTHODONTIC diagnosis, treatment planning, and prognosis are intimately related to orthodontists' concepts of dentofacial esthetics. For many years the production of satisfactory mechanical relationships of the teeth and jaws was thought to be the only element necessary in the compounding of a successful orthodontic result. The advent of such an evangelist as Case[1] produced an awareness of facial esthetics which has continued to grow until many orthodontists, whether acknowledging the fact or not, regard facial esthetics as the prime objective of orthodontic therapy. (Interesting notes regarding facial esthetics, entitled "Observation Training," appear in Case's book.)

HISTORY

It may be well to attempt to evaluate the sources from which orthodontists' concepts of facial esthetics have been derived. There are three primary sources from which we accept or obtain our esthetic ideals.

The first source of esthetic idealism was probably derived from paintings, drawings, and ancient sculptures. In the early writings of Angle[2] we note frequent references to the classic profile of Apollo. For many years, artists have attempted to establish standards for facial esthetics. Hatton,[3] in a book entitled *Figure Drawing,* describes changes that he would make in the profile of Venus of Milo to approximate the type made famous by Sir Edward Burne-Jones. "The upper part of the nose is set back, and the jaw is robbed of some of its fullness by accentuation of the bone." Vanderpoel,[4] in his book entitled *The Human Figure,* notes that the lips fall on a backward-sloping plane from nose to chin, the upper lip overhanging the lower and the lower lip overhanging the chin (Fig. 2).

A second source of concepts of esthetics developed through the tremendous influence of such men as Grieve[5] and Tweed,[6] who have developed concepts of esthetics based upon accepting as pleasing or satisfactory a face in which the orthodontist visualizes a denture as stable and incisors in an uncrowded, upright position. Elaboration of this concept is a subject which demands a singular investigation in itself.

This thesis, which was given as a partial fulfillment of the requirements for certification by the American Board of Orthodontics, is being published with the consent and the recommendation of the Board, but it should be understood that it does not necessarily represent or express the opinion of the Board.

In 1949, an attempt was made to determine whether or not any uniformity of opinion existed among orthodontists. Groups of profile tracings of normal and abnormal occlusions were submitted for evaluation to a large group of orthodontists in the Midwest. I reported the results in a separate paper.[7] The soft-tissue profile outlines which were judged by the orthodontists to be pleasing revealed skeletal parts arranged in a straight line or flat plane with little or no dental protrusion. In contrast, those facial soft-tissue profile outlines judged to be poor revealed convex skeletal patterns and greater-than-average dental protrusions.

A third concept of esthetics has been taken from cephalometric angular and linear standards which have been established from lateral headfilms by Downs[8] and other workers. Downs's standards are based upon a group of persons with excellent occlusions. Other standards from lateral headfilms have been drawn by Younger,[9] Mayne,[10] Toothaker,[11] Baum,[12] Petraitis,[13] Margolis,[14] Noyes, Rushing, and Sims,[15] Speidel and Stoner,[16] etc., almost entirely on the basis of "normal occlusion." Even more personalized standards have been established by Steiner,[17] based upon simplicity and convenience of use.

Another possible source of development of esthetic concepts and ideals has been investigated, though not accepted, by several authors. Wylie,[18] on occasion, has made reference to the different types of faces popular in fashion magazines. Moore[19] has made notations concerning maturation changes of the facial profiles of several persons whose pictures appeared on the front cover of a well-known magazine. In 1947, I attempted an investigation of profile photographs of female Hollywood "stars." Profile photographs were projected to normal size in an enlarger and a single line tracing of the soft-tissue profile was made. Tracings of several "name stars" were included with a group of profile tracings of persons having excellent occlusions and these tracings were submitted for the opinion of orthodontists in the Midwest. It was interesting to note that none of the tracings of female Hollywood stars were judged to be anything more pleasing than "fair" in the opinions of the orthodontists. Most of the "stars'" profiles were regarded as too protrusive.

It is apparent, at least to the present date, that (1) standards for esthetics have been based upon the works of artists, sculptors, painters, etc.; (2) esthetic standards have been determined as satisfactory if a mental image of a stable denture could be seen beneath the soft-tissue draping; (3) orthodontists have established standards of normalcy, based upon normal occlusion; and (4) personal singular concepts of proportionality are in frequent vogue.

With a view to determining what modern concepts of facial esthetics might be, it was thought desirable to attempt an investigation of esthetics, not from the viewpoint of the orthodontist, but from the viewpoint of the general public. An attempt was made to find a group of persons having what the public believed to be satisfactory, pleasing, or acceptable faces. Possible sources of such a group of persons are limited. To my knowledge, a grouping of males, based upon facial esthetics, does not exist. Models for fashion magazines or Hollywood personalities might be used, but such persons, at least in this area,

are not available. Further, many of the Hollywood stars are selected for certain outstanding characteristics, too many of which have nothing to do with facial esthetics. It was deemed desirable to secure a group available for the taking of lateral oriented cephalometric headfilms to examine underlying dentofacial relationships. In the Northwest, several possible sources of female subjects possessing the above characteristics were available: (1) fashion or model agencies have lists of girls whom they employ to model their clothes and whose faces must be at least esthetically acceptable (it was found difficult to secure enough of these girls for a statistical analysis); (2) during the past several years, it has been the custom in the City of Seattle to select princesses for the Seattle Seafair week. These girls are selected to represent their communities as a more or less ideal young female type by judges unknown to the contestants. They are selected on the basis of appearance, personality, and poise.* The queen and princesses for the 1955 Seattle Seafair celebration provided the material for this examination.

The problem of this investigation was to determine the dentofacial relationships present in a group of Seattle Seafair princesses and their queen.

METHOD AND MATERIAL

The material for this examination consisted of the following records taken from thirty Seattle Seafair princesses and their queen:

1. A brief history and oral examination, the form of which is shown in Chart 1.

2. Kodachrome pictures were taken of the face of each of the girls, in a straight frontal and a true profile position and in several other positions deemed possibly more artistic by the dental photographer of the University of Washington.

3. Oriented lateral headfilms were taken of each of the girls in the Broadbent-Bolton cephalometer by accepted methods, (a) with the teeth in occlusion, (b) with the mandible in rest position, and (c) with a cork placed between the teeth to secure a better view of the mandibular condyle. The investigation included only lateral cephalometric roentgenograms, as it was decided that frontal pictures would be of little value.

4. Tracings were made from the lateral headfilms with teeth in occlusion, and various skeletal and denture angular measurements, as well as linear measurements, were recorded. Means were derived for each of these measurements and these mean and range figures were compared to standards established by other investigators upon the basis of normal occlusion.

GLOSSARY

I. The following angular relationships were recorded:

The angle of convexity (N-A-P): Formed by planes from nasion to point A and from point A to pogonion (Downs).

*Information from Seattle Seafair Committee.

Name ----------

Address Phone

Age Birthday

Have you ever had orthodontic treatment?

If so, at what age? By whom

How long? Retainers?

Do you, or did you ever, have any finger-sucking or tongue-biting habits? Yes No

Oral Examination

Extracted teeth:

Deciduous Age Space maintainer

Permanent Age

Missing teeth

Supernumerary teeth

Molar relationship

Cuspid relationship

Rotated teeth

Malaligned teeth

Overbite

Overjet

Midline deviation

Remarks:

Chart 1.

The angle A-N-B: Formed by planes from point A to nasion and from nasion to point B (Riedel).

The facial angle: Formed by the intersection of the Frankfort-horizontal plane and a line drawn from nasion to pogonion (Downs).

The Frankfort-mandibular plane angle: That angle formed by the Frankfort-horizontal plane and a line drawn tangent to the lower border of the mandible (Downs, Tweed).

The mandibular incisor to Frankfort angle (FMIA): That angle formed by the long axis of the most labial mandibular incisor with the Frankfort-horizontal plane (Tweed).

The mandibular incisor—mandibular plane angle (IMPA): That angle formed by the long axis of the most labial mandibular incisor to the mandibular plane (Downs, Margolis, Tweed, etc.).

The Ul-Ll angle: The angle formed by the intersection of the lines representing the long axes of the most labial maxillary and mandibular incisors (Downs, Riedel, etc.).

The Ul-FH angle: The angular relationship of the most labial maxillary incisor to the Frankfort-horizontal plane (Riedel).

The Ll-AP angle: The angular relationship of the most labial mandibular incisor to the AP plane (Downs*).

The Ul-NA angle: The axial inclination of the most labial maxillary incisor to a plane drawn from nasion to point A (Steiner) (Riedel*).

*Unpublished data.

The Ll-NB angle: The angle formed by the long axis of the most labial mandibular incisor to a plane drawn from nasion to point B (Steiner).

II. Several linear relationships were recorded as follows:

Ul-AP: The distance, measured in millimeters, from the midpoint of the incisal edge of the most labial maxillary incisor to a line drawn from point A to pogonion (Downs).

Ul-NP: The distance, in millimeters, from the midpoint of the incisal edge of the most labial maxillary incisor to a line drawn from nasion to pogonion (Riedel).

Ll-AP: The distance, in millimeters, from the midpoint of the incisal edge of the most labial mandibular incisor to the line AP (Downs*).

Ul-NA: A measure, in millimeters, from the midpoint of the incisal edge of the most labial maxillary incisor to the plane NA (Steiner).

Ll-NB: A measure, in millimeters, from the midpoint of the incisal edge of the most labial mandibular incisor to the plane NB (Steiner).

III. The following measurements of the thickness of the soft tissue labial to the incisor teeth were included:

Ul-U Lip: A measure, in millimeters, of the thickness of the tissue from the labial surface of the most labial maxillary incisor to the most prominent portion of the soft tissue of the upper lip.

Ll-L Lip: A millimetric measure of the tissue thickness from the labial surface of the most prominent mandibular incisor to the most prominent point on the soft tissue of the lower lip.

A-Ax: A millimetric measurement from point A to the innermost curvature of the soft tissue between the nose and the upper lip.

Ul-L Lip: A measure, in millimeters, of the distance from the most labial surface of the most prominent maxillary incisor to the most prominent point of the soft tissue of the lower lip.

OBSERVATIONS

The average age of the thirty girls used in this study was 18 years 10 months, with a range from 17 years 9 months to 21 years 5 months. Twenty-one of the girls had Class I malocclusions; four girls had Class II, Division 1

TABLE I

Observations:

Mean age: 18 years 10 months (range—17 years 9 months to 21 years 5 months)

Dental classification: (Angle)

Class I	21
Class II, Division 1	4
Class II, Division 1 subdivision	2
Class II, Division 2	3
	30

Number of girls who had received previous orthodontic treatment—4 (all presently Class I)
(In one instance, four permanent premolars were removed to facilitate treatment)

Loss of permanent teeth: (12 persons)

Teeth Lost	*Number of Instances*	*Teeth Lost*	*Number of Instances*
LR 6	6	UL 5	1
LL 6	5	UR 1	1
LR 5	3	UL 1	1
UR 4	3	UR 7	1
LL 4	2	UL 7	1
LL 5	2	UR 5	1
UL 6	1	LR 4	1
		UL 4	1

TABLE II. SKELETAL MEASUREMENTS

MEASUREMENTS	SEAFAIR PRINCESSES		ADULT FEMALE NORMALS (PETRAITIS[13])		MIXED EXCELLENT OCCLUSIONS (DOWNS[8])		ADULT NORMAL OCCLUSIONS (MIXED) (RIEDEL)		30 ADULT FEMALE NORMAL OCCLUSIONS (RIEDEL)	
	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE
N-A-P (skeletal convexity)	+3.05°	–6.0° to 12.0°	+3.0°	–5.5° to 11.5°	0.0°	–8.5° to 10.0°	+1.62°	–9.0° to 11.0°		
A-N-B (anteroposterior relation apical bases)	+3.4°	+0.5° to 7.0°					+2.07°	–2.5° to 6.0°	+2.55°	–2.0° to 6.5°
Facial angle (FH-NP)	87.8°	82.5° to 92.0°	87.8°	82.5° to 93.0°	87.8°	82.0° to 95.0°	88.5°	82.5° to 94.5°		
FH-Mandibular plane angle	22.5°	11.3° to 34.0°	23.6°	13.0° to 34.5°	21.9°	17.0° to 28.0°	26.1°	14.0° to 38.0°		

malocclusions; two girls had Class II, Division 1 subdivision malocclusions; and three girls had Class II, Division 2 malocclusions. Four of the thirty girls had received orthodontic treatment, and all were presently in Class I (Angle) relationships. Twelve of the girls had lost one or more permanent teeth other than the third permanent molars. In one case this was due to the congenital absence of the mandibular second premolars and, in another case, to loss of the maxillary central incisors in an accident. One of the girls who had received orthodontic treatment had four permanent premolars removed in order to facilitate treatment. The teeth most frequently lost were the mandibular first permanent molars; in six of the girls, the mandibular right first permanent molar had been removed; in five of the girls, the mandibular left first permanent molar had been removed. (See Table I for enumeration of other lost teeth.)

Included in the examination charts was a question as to whether early habits, such as thumb-sucking, etc., could be recalled. Six girls indicated that they had been thumb-suckers at an early age. Of the thumb-suckers, four had Class I and two had Class II, Division 1 malocclusions.

DISCUSSION OF STATISTICAL FINDINGS

Skeletal Pattern (Table II).—Of the four angular measurements related to skeletal pattern, two showed no significant difference from figures previously established by Downs, Petraitis, and Riedel. The mean facial angle of this group was 87.8 degrees and the Frankfort-mandibular plane angle was 22.5 degrees. The angle of convexity, however, was +3.05 degrees, which is slightly larger than the mean of 0.0 determined by Downs and the mean of +1.6 degrees determined by Riedel, but in good agreement with that of +3.0 degrees found by Petraitis in adult females. The range of −6 to +12 degrees was slightly skewed to the plus side of the ranges determined by Downs and Riedel, but similar to that found by Petraitis. The differences found between this group and those groups studied by Downs and Riedel may be accounted for by the fact that Downs and Riedel's groups included male subjects. The angle A-N-B was 3.4 degrees, which was similar to the mean determined by me in a group of thirty adult females with normal occlusions.

The degree of mandibular prognathism as recorded by the facial angle was similar to previous studies. However, the maxillary denture base (N-A-P) in the Seafair group was relatively more protrusive when compared to standards which included male subjects. When comparing the relative protrusion of maxillary denture base to adult female normal occlusion studies, little difference could be noted. It must be concluded, therefore, that the Seafair group seemed to have essentially the same skeletal characteristics as persons selected on the basis of normal occlusion only.

Denture Pattern (Table III).—The Frankfort-mandibular incisor angle was 63 degrees with a range from 46.5 to 78 degrees; thus, the mandibular incisor is found to be approximately 5 degrees more labially inclined than in

TABLE III. DENTURE MEASUREMENTS

MEASUREMENTS	SEAFAIR PRINCESSES		TWEED, STEINER (PETRAITIS—ADULT FEMALE NORMALS)		MIXED EXCELLENT OCCLUSIONS (DOWNS)		ADULT NORMAL OCCLUSIONS (MIXED) (RIEDEL)		30 ADULT FEMALE NORMAL OCCLUSIONS (RIEDEL)	
	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE	MEAN	RANGE
Ll-FH (FMIA)	63.08°	46.5° to 78°	68° (Tweed)	56° to 80°	68°	50° to 81°	62°	50° to 74°		
Ll-Mandibular plane (IMPA)	94.2°	80.5° to 116°	96.2° (Petraitis)	83.4° to 112°	91.4°	83° to 98.5°	91.9°	77° to 107°		
Ul-Ll (relative inclination of incisors)	135.75°	105.5° to 163.5°	90° (Tweed) 130.0° (Petraitis)	85°-95° 112.5° to 147.5°	135.4°	130° to 150.5°	130.98°	112° to 148°		
Ll-AP (angular relation of mandibular incisor to lower face)	23.16° (2 cases 12°—balance from 19 to 28.5°)	12° to 28.5°			23.19°	17° to 29° (Calculated by author)				
Ul-FH (maxillary incisor inclination)	106.9°	94° to 120.5°					111.24°	99.5° to 123.5°	110.23°	94° to 120.5°
Ul-NA (angular relation)	17.68°	3.0° to 31.5°	22° (Steiner)							
Ll-NB (angular relation)	23.25°	8.3° to 40.5°	25° (Steiner)							
Ul-AP (relative protrusion to lower face—linear)	+4.63 mm.	−1.0° to +10 mm.	+5.4 mm. (Petraitis)	+0.5 to 10.0	+2.7 mm.	−1 mm. to +5.0 mm.	+5.09 mm.	0.5 to 9.5 mm.	+5.45 mm.	+2.0 to +9.0
Ll-AP (relative protrusion to lower face—linear)	+3.95 mm. (1 case—1.5—balance from +1 to +9.5)	−1.5° to +9.5 mm.			0 mm.	−2 to +3 mm.				
Ul-NP (relative protrusion to facial plane—linear)	+5.43 mm.	−2 to +14 mm.					5.51 mm.	−1.0 to +11.0 mm.	6.48 mm.	−2.0 to 11.5 mm.
Ul-NA (linear relation)	2.66 mm.	−2.0 to +8.0 mm.	4.0 mm. (Steiner)				4.58 mm.	0 to +9.5 mm.	4.25 mm.	−1.0 to +8 mm.
Ll-NB (linear relation)	4.01 mm.	1.0 to 10.5 mm.	4.0 mm. (Steiner)							

TIGHTLY BOUND

the cases examined by Downs and Tweed (68 degrees, mean), but similar to the mean which I found in adult normals (62 degrees, mean). The incisor-mandibular plane angle was 94.2 degrees, which might be expected from the previous notation on the Frankfort-mandibular incisor angle, and again indicates a more labial inclination than recorded by Downs or Tweed. The range is also extended beyond the minimum and maximum limits found by Downs and Tweed.

The mean axial inclination of maxillary incisor to mandibular incisor was found to be 135.75 degrees, which is very similar to that noted by Downs. The range of 112 to 163.5 degrees is well outside the limits of range that Downs determined (130 to 150.5 degrees). There was only one case in which there was a figure greater than 148 degrees which, if excluded, would make the range similar to that found by Petraitis and Riedel (112 to 148 degrees).

A measure of the axial inclination of the maxillary incisor to Frankfort-horizontal plane resulted in a mean of 106.9 degrees and a range of from 94 to 120.5 degrees. The mean figure is somewhat less than the mean of 111 degrees determined by me, but the range is almost exactly the same as the adult female normal group.

Recently, Downs[20] indicated that he thought it desirable to measure the angular relationship of the mandibular incisor to the AP plane. The mean figure for this group was 23.16 degrees, which is almost exactly the same as that noted by Downs. The range, however, was somewhat larger, namely, 12 to 40 degrees. Two persons had readings of 12 degrees and one had a reading of 40 degrees. The remaining measurements ranged from 19 to 28.5 degrees.

Two other angular measurements recorded for this group were those which Steiner included in his analysis. The mean for the inclination of the maxillary incisor to the NA plane was 17.68 degrees, with a range from 3 to 31.5 degrees. This is approximately 4.5 degrees less than the norm suggested by Steiner. The axial inclination of the mandibular incisor to the NB plane was found to have a mean of 23.25 degrees and a range from 8.5 to 40.5 degrees. This is slightly less than the norm of 25 degrees, suggested by Steiner.

In summarizing the differences between the Seafair and normal occlusion groups in the angular relationships of maxillary and mandibular incisors, it might be postulated that these are compensatory differences. Since the Seafair group had a greater degree of protrusion of the maxillary denture base, the maxillary incisors would have to be more upright in order to maintain normal relationship with the mandibular incisors. The mandibular incisors would have to be slightly more protrusive to horizontal planes (FH and mandibular plane) in order for the interincisal angle to remain the same in both the Seafair and normal occlusion groups. It follows, then, that the relationship of the mandibular incisor to the AP plane, which was the same in both groups, compensates for variation in skeletal convexity and is, therefore, probably a better measure of esthetic relationship of the mandibular incisors.

Five millimetric measurements of the anteroposterior positions of the maxillary and mandibular incisors were included as follows:

The mean reading for maxillary incisor to AP plane was 4.63 mm. with an actual range of –1 mm. to +10 mm. The mean figure here is 2 mm. greater than that found by Downs, but very similar to the figures found by Petraitis and Riedel. The range is also on the plus side when compared to Downs's figures, but very similar to the ranges found by Petraitis and Riedel. The second millimetric measurement was that of the mandibular incisor to the AP plane, for which was found a mean of 3.95 mm., and a range from –1.5 mm. to +9.5. Only one person had a minus reading in this measurement; the rest ranged from +1 to +9.5 mm. This is in contrast to the mean of 0.0 determined by Downs and the range of –2.0 to +3.0 mm.

A mean of 5.43 mm. was found in the relationship of the maxillary incisor to the NP plane, and a range from –2 mm. to +14 mm. Eliminating the high and low extremes, the range was from +1 to +11. The mean and range for this figure are quite similar to those determined by Riedel.

Another measure of the relative protrusion of the maxillary incisor, that of the maxillary incisor to the NA plane, was found to have a mean of 2.66 mm., compared to Steiner's norm of 4 mm. The range found here was from –2 to +8 mm. A mean figure of 4.25 was established by me in an investigation of thirty adult female normal occlusions and a range of –1 to +8.0 was determined.

The last millimetric measurement was that from the mandibular incisor to the NB plane, and it was found to have a mean of 4.01 mm. and a range from 1 to 10.5 mm. The mean found here was almost exactly that which Steiner suggested for his norm.

These millimetric measurements merely substantiate the conclusions previously drawn from angular measurements.

TABLE IV. SOFT-TISSUE MEASUREMENTS

	Mean		
Ul-U Lip	10.75 mm.	Range: 5.0 to 14.5	
	(One case 5.0 mm.—one case 6.5 mm.—balance from 9.0 to 14.5 mm.)		
Ll-L Lip	12.98 mm.	Range: 8.5 mm. to 16.0 mm.	
	(One case 8.5 mm.—one case 9.5 mm.—balance from 10 to 16 mm.)		
A-Ax	14.06 mm.	Range: 10.5 to 16.0 mm.	
	(One case 10.5 mm.—one case 11.0 mm.—balance 12 to 16 mm.)		
Ul-L Lip	8.85 mm.	Range: 5.5 mm. to 11.0 mm.	
	(Eliminating both extremes provides range of 6.5 to 10.5 mm.)		
	Ul-Ll—Chin	All contacting same plane	14 cases
	Nose-Ul—Chin	All contacting same plane	1 case
	Nose-Ll—Chin	All contacting same plane	2 cases
	Nose-Ul—Ll—Chin	All contacting same plane	None

Soft-Tissue Measurements (Table IV).—A measure of the soft tissue immediately labial to the maxillary incisor was found to have a mean of 10.75

mm. and a range from 5.0 to 14.5 mm. It is interesting to note that only two girls presented less than 9 mm. of tissue thickness, one being 5.0 and the other 6.5. In both of these cases, the girls showed strain when bringing their lips together to cover their teeth.

The tissue thickness labial to the mandibular incisor was determined to have a mean of 12.98 mm. and a range from 8.5 to 16 mm. As in the above measurement, the same two girls presented measures of less than 10 mm., that is, one of 8.5 mm. and one of 9.5 mm.

A measure from point A to the innermost curve of the tissue beneath the nose was found to have a mean value of 14.06 mm. and a range from 10.5 to 16 mm. Again, it is interesting to note that only two girls presented measurements of less than 12 mm.—one of 11 and one of 10.5 mm. If these cases are excluded, the tissue thickness has a narrow range of only 4 mm.

The measure of tissue thickness from the upper incisor to the most prominent point of the lower lip was found to have a mean of 8.85 mm. and a range from 5.5 to 11 mm.

The soft-tissue measurements were made in order to evaluate the degree of variation that exists in these relationships. It has been verbally stated in the past that there is considerable variation in soft-tissue thickness and that the relative position of the incisors is not directly related to facial esthetics. Upon the basis of the narrow range of the measurements recorded here, it is my considered opinion that the soft-tissue profile is closely related to the skeletal and dental structures that comprise the bony profile.

VARIATIONS

The generalizations made in the preceding portion of this article were based upon comparisons of *mean* figures of several groups of persons and should not be applied to any specific case. For purposes of illustration, several cases are included to emphasize individual variations. Figs. 1, *a* and 1*A* illustrate the case with the most negative angle of convexity (6.0 degrees) and Figs. 1, *b* and 1*B* show the one with the highest angle of convexity (+12.0 degrees). Both of these cases represent facial relationships that were considered esthetically acceptable. Figs. 1, *c* and 1*C* illustrate the greatest inclination of maxillary to mandibular incisor (112.5 degrees) and Figs. 1, *d* and 1*D* show the most upright mandibular incisor to the AP plane (12 degrees). These were the extremes of variation found in the Seafair princesses whose appearance, at least in the opinions of the judges who selected them, was deemed esthetically acceptable and desirable.

NOTATIONS

It was noted, in examining the various headfilm tracings, that the lines representing the long axis of the maxillary and mandibular incisors crossed exactly at the AP plane in nine of the tracings, and in an additional nine tracings the intersection was not more than 3 mm. from the AP plane (Fig.

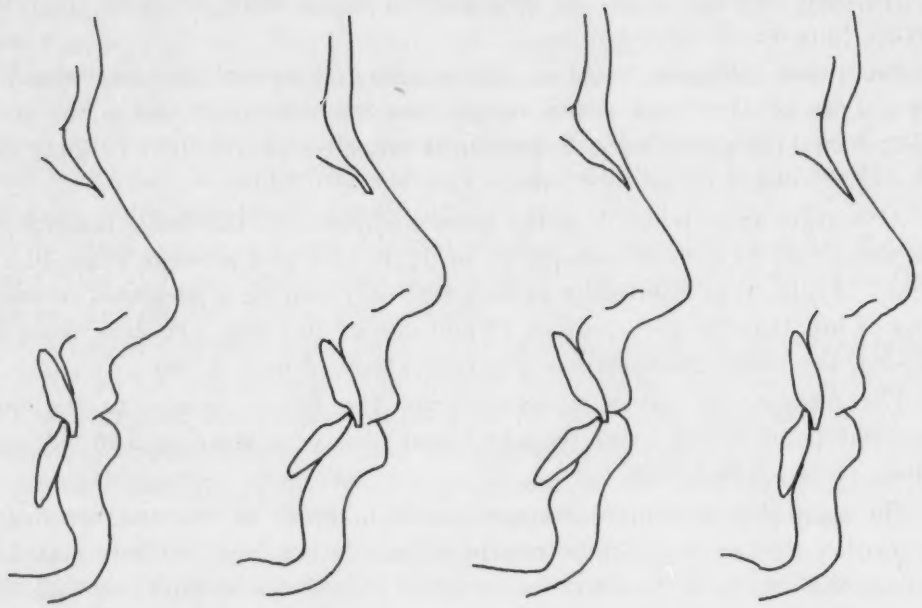


Fig. 1.—*a*, Case with −6.0 degree angle of convexity (lowest in the Seafair group); *b*, case with +12 degree angle of convexity (highest in the Seafair group); *c*, case with greatest inclination of maxillary incisor to mandibular incisor (105.5 degrees); *d*, case with most upright mandibular incisor to AP relationship (12 degrees).

Fig. 1A.—Case with −6.0 degree angle of convexity (lowest in the Seafair group).

Fig. 1*B*.

Fig. 1*C*.

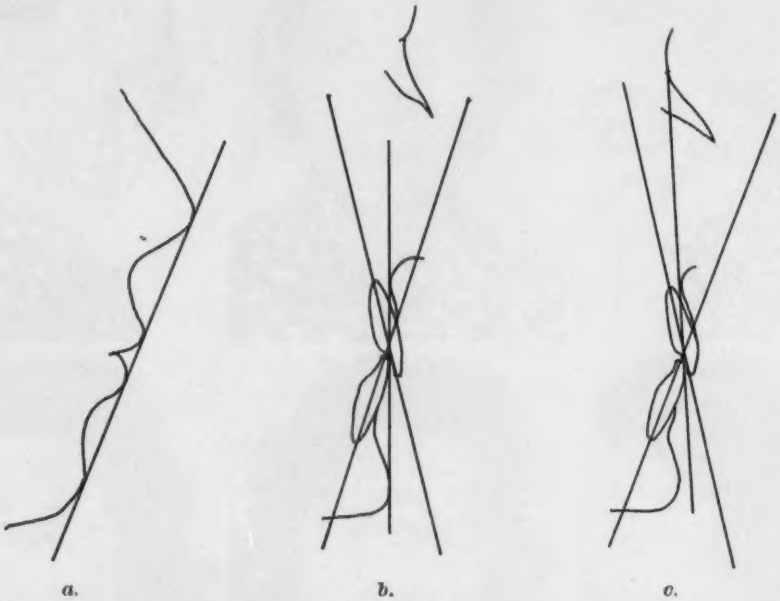
Fig. 1*D*.

Fig. 1*B*.—Case with +12 degree angle of convexity (highest in the Seafair group).

Fig. 1*C*.—Case with greatest inclination of maxillary to mandibular incisor (105.5 degrees).

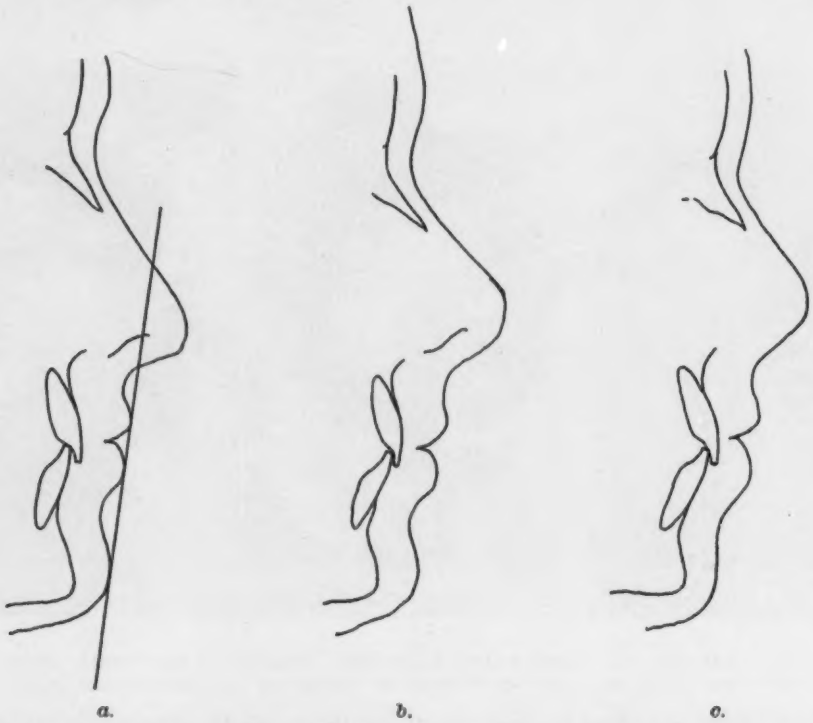
Fig. 1*D*.—Case with most upright mandibular incisor to AP relationship (12 degrees).

2, *b*). It was my opinion that, when the axes of the incisors intersected close to the AP plane, the persons concerned were more likely to have good facial balance.



a. *b.* *c.*

Fig. 2.—*a*, Nose, upper lip, lower lip, and chin all fall along the same plane; *b*, lines representing the long axes of the maxillary and mandibular incisors intersecting exactly at the AP plane; *c*, lines representing the long axes of the maxillary and mandibular incisors intersecting exactly at the NA plane.



a. *b.* *c.*

Fig. 3.—*a*, Upper lip, lower lip, and chin fell along the same plane in fourteen instances; *b*, 1955 Seafair Queen; *c*, 1954 Seafair Queen.

Fig. 3*A*.

Fig. 3*B*.

Fig. 3*C*.

Fig. 3*A*.—Upper lip, lower lip, and chin fell along the same plane in fourteen instances.
Fig. 3*B*.—1955 Seafair Queen.
Fig. 3*C*.—1954 Seafair Queen.

In thirteen instances the axes of the maxillary and mandibular incisors intersected exactly at the NA line. In thirteen of the remaining cases the NA line fell behind this intersection, and in five cases it fell in front of the intersection of the axes of the incisors (Fig. 2, *c*).

Straight lines were drawn on the soft-tissue profile outlines from the chin to the lower lip and from the chin to the upper lip (Fig. 3, *a*). In fourteen of the tracings the upper lip, lower lip, and chin fell along a single plane. In two instances the line from the chin to the lower lip touched the outermost tip of the nose. In one instance a line from the chin to the upper lip touched the nose. In no instance did the chin, upper and lower lip, and nose contact a single straight line. This is in complete disagreement with artists' concepts that nose, upper lip, lower lip, and chin should fall along a single plane.

It is interesting to note how the various measurements of the girl chosen as queen compared to the mean of the Seafair group. The four skeletal measurements fell within 1 degree of the mean. Measurements of the lower incisor were almost exactly the same as the means for incisor-to-mandibular and incisor-to-Frankfort-plane measurements. The relation of the upper to the lower incisor was 8 degrees larger than the mean, largely because the maxillary incisor was somewhat more upright. Millimetric measurements of the upper incisor to AP and NP were 1 mm. less than the means. All soft-tissue measurements were within 1 mm. of the mean for each measurement. It was also interesting to note that the axis of the upper and lower incisors intersected within 1 mm. of the AP line and, further, that a straight line connecting the chin and upper lip touched the lower lip as well. The girl had an excellent occlusion and these relationships all seem to be conducive to a well-balanced face (Figs. 3, *b* and 3*B*). Records were obtained of the queen selected in 1954 (Figs. 3, *c* and 3*C*), for comparison with the 1955 queen. The degree of similarity between these girls was striking.

CONCLUSIONS

1. Certain angular and linear measurements were recorded from tracings of oriented lateral headfilms of a group of Seattle Seafair princesses.

2. The skeletal patterns of the girls studied were very similar to those recorded in previous studies of normal occlusions.

3. The dental pattern of the girls studied indicated (a) relatively greater axial inclination of the mandibular incisor to certain planes and (b) relatively normal over-all protrusion, but a lesser average inclination of the maxillary incisors when compared to previous studies.

4. A range of soft-tissue thickness labial to maxillary and mandibular incisors was recorded.

5. In approximately one-half the cases, the upper lip, lower lip, and chin fell along the same plane.

6. In a number of instances, the lines representing the axial inclinations of the maxillary and mandibular incisors intersected exactly at the AP or NA lines.

7. The girl selected as queen from among this group of princesses recorded measurements which fell within 1 degree or 1 mm. of the mean in almost every instance, except those related to the maxillary incisors. Almost the same notation can be made regarding the queen for 1954.

8. The public's concepts of acceptable facial esthetics are apparently in good agreement with standards established by orthodontists on the basis of normal occlusion.

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1551 Medical-Dental Bldg.

THE TEACHING OF UNDERGRADUATE ORTHODONTICS AT THE HARVARD SCHOOL OF DENTAL MEDICINE

MELVIN I. COHEN, B.S., D.M.D.,* BOSTON, MASS.

INTRODUCTION

THE lack of uniformity in the teaching of undergraduate orthodontics may well reflect the inconsistency of objectives in the administrative heads responsible for this training. This inconsistency is not peculiar to the dental curricula of today, but is a natural outgrowth of the controversial development of orthodontic education. In a sense, this pedagogic inconsistency, in turn, reflects the many variations in methods, training, and concepts that have been historically ubiquitous in this field.

Orthodontics first made its appearance in the dental curriculum as a part of the prosthetics departments about 1890, although Angle had actually begun teaching in Minnesota in 1885. About the turn of the century, however, Angle left in disgust because he could get neither the recognition nor the appropriation of time necessary for his subject. He then formed the Angle School, a proprietary school designed for the graduate dentist who intended to specialize in this subject.

Training in orthodontics continued uneventfully in the dental schools until 1921, when Johnson[3] reported for the Educational Committee of the American Society of Orthodontists on "Undergraduate Instruction in Orthodontia." He made the timely observation: "The science of orthodontia treats the growth, development, and functional activities of the dental apparatus and so constitutes an essential element in the undergraduate curriculum." The viewpoint that the biologic basis of orthodontics must be driven home to the student was expressed and emphasized. Once an appreciation of the utter necessity for a scientific foundation is conveyed, the principles of the art of orthodontics may be demonstrated as a method of implementing a valid diagnosis. That article is remarkable not only because of the pertinence today of the observations made then, but also because their validity was so often obscured by the intense interest in mechanotherapy in the immediate years ahead. In general, reports by Badcock[4] in England and others upheld this viewpoint.

In 1932, a "Report of Research"[5] made some desirable suggestions for increasing the quality and quantity of teachers of orthodontics, as well as

*Assistant Clinical Professor of Orthodontics, Harvard School of Dental Medicine; Orthodontist, Children's Medical Center.

some pertinent recommendations for lectures, seminars, and laboratory instruction. However, the Curriculum Survey Committee[6] of 1935 made the more interesting report. It concluded that the inaccessibility of orthodontics to the masses suggests: "Many general dental practitioners in the future should assume the responsibility to render orthodontic services and that, consequently, the dental schools should prepare them to meet this obligation. This service should include advisory and preventive service and the correction of the simpler cases of malocclusion." The inclusion, in its recommendations, of the treatment of simple cases by students precipitated a controversy whose solution is yet to be universally agreed upon. One of the most vocal critics of this latter recommendation was Noyes.[7] He claimed: "Because of the character of the basic training and the immaturity in the very essential orthodontic knowledge, as well as the time consumed in treatment, retention, and observation, the subject does not lend itself to the didactic requirements of undergraduate teaching. Until the data in this field have been accumulated and reduced to a more exact understanding, it will not be possible to supply empirical rules which must form the basis for judgment, replacing that arising through the laborious and time-consuming method of experience. Until this advance has been attained, no rules for distinguishing simple and difficult cases can be supplied, nor can the material presented in brief lecture courses furnish attainment of the objectives in the report."

Fourteen years following the report by the Curriculum Survey Committee, the Education Committee of the American Association of Orthodontists reported, in 1948, that the dental curriculum does not provide adequate time for clinical training in orthodontics and, therefore: "There is no short cut for a general practitioner of dentistry to prepare himself adequately to do forthright orthodontics except in the field of prevention." This reversal of opinion prompted the American Association of Dental Schools to appoint a committee to poll the dental schools throughout the country and determine the status of undergraduate teaching. This committee, for the first time, provided comprehensive information on what the dental schools were teaching in this undergraduate course and how they were doing it, and then proceeded to make some most notable suggestions for the future.[8]

From this report, it became evident that four schools taught by lecture only; four by lecture and laboratory; three by lecture and demonstration; twelve by lecture, laboratory, and demonstration; eleven by lecture, laboratory, demonstration, and more or less limited clinic; and twenty-two by lecture, laboratory, and more or less limited clinic. The time devoted to this teaching varies from fourteen to 314 hours. The recommendations and conclusions of this committee can be summarized briefly:

> The maintenance of the functions of occlusions is the major objective of dentistry and the study of occlusion should form the basis of all dental teaching. The importance of growth and development of the face and dentition is then stressed. Orthodontics

should be thought of as an integral part of the undergraduate dental training and should occupy a definite position as one of its departments. The objectives of this undergraduate department should be:

1. To anticipate and detect malocclusion.
2. To take steps to prevent and intercept malocclusion where possible.
3. To treat simple cases or the simple immediate problems of complex cases.
4. To use this knowledge as an adjunct to procedures in all other phases of dental practice.
5. To know what cases to avoid and refer to more experienced men in the field.

The suggestion is made that the curriculum be examined critically to provide time for implementing the above objectives. The tendency for overspecializing and underestimating the students' capacity to learn is alluded to and the necessity for continued study in all areas of dentistry following graduation is pointed out. The general approximation of 300 hours from the 4400 curriculum hours for carrying out the above objectives is estimated.

DESCRIPTION OF COURSE

Most educators and orthodontists now agree that the teaching and practice of orthodontics rest solidly on a biologic foundation. The method of achieving this foundation and its extent in depth may be variously interpreted throughout the country. All students at the Harvard School of Dental Medicine spend the first two years at the Medical School, where they take the same courses in the basic sciences as the medical students. At the completion of the two years of basic sciences, the students enter the dental infirmary where they spend the last two years in an intense program of clinical disciplines. It is very early in the junior year that they begin their course in orthodontics, which extends over the two clinical years.

During the third week, impression taking and model trimming are taught. Four half-days are allowed for demonstrating the use of the alginates and enabling the students to take satisfactory impressions of each other and to pour and trim the models. By Saturday of this week, the students take impressions of their first orthodontic patient who has been previously selected and assigned.

The fifth week of school is designated as Orthodontic Week and is devoted entirely to this subject. During previous lectures, terminology, classification, and history taking have been discussed. By this time, prophylaxis has been taught and carried out on the orthodontic patient. A complete history is taken, including an operative examination and a system review. Any cavities, other than those on teeth to be banded, will be filled by the student who assumes full dental responsibility for this patient. The first patient assigned is usually one with a Class II malocclusion which should respond to a nonextraction, labiolingual technique, although one Class III malocclusion is included in the group. In order to get treatment of the patient under way, a concentration of effort on appliances and mechanotherapy is essential at first, but this necessity is placed in proper perspective.

The objective of appliance training is to teach the simplest appliance techniques which will achieve the desired objectives—techniques which can be taught to an undergraduate who may carry them into his armamentarium in the general practice of dentistry. The class is divided into groups of four or five. The making of all four molar bands (gold loop bands) is demonstrated on two patients. Any techniques needed to carry on in the demonstration are explained and illustrated at the chair. The student then returns to his patient and carries out this procedure. Sufficient help and supervision are provided to insure satisfactory results. The next day, the fabrication of the labial and lingual appliance is shown to the small groups. The student practices with German silver and then prepares his own appliance in gold. There is a vast difference in the amount of help that a student needs in this initial stage, and the supervision is varied to the needs of the student. In the latter part of the week, demonstrations on cementation are given, following which the student cements his appliances in his own patient. By the end of this week, each student has appliances placed in the mouth and activated.

During Orthodontic Week, six or more lectures are given. Sufficient time is spent on appliances to provide a background for the demonstrations and work in the mouth, although much of this is done at the chair. In addition, lectures are given on the individual normal and on etiology. Tissue response to tooth movement is taught during this week as part of an over-all plan at the school to integrate the basic material with its clinical application. An afternoon is devoted to the description of the normal periodontium and surrounding alveolar bone as well as to some review on basic bone physiology. At the end of this session, the classic European work on tissue response is covered, as well as some rat studies from the school collection by Waldo and Rothblatt. At the end of the week, the lecture series on growth and development is begun.

During the first semester weekly lectures on growth and development, genetics (provided by a human geneticist), prevention, and early and mixed dentition treatment are continued.

During the second semester, the weekly lectures are changed to seminars. Each student selects a subject on which he critically evaluates the literature. He reports his findings to his fellow students, allowing enough time for discussion and questioning of his conclusions. The subjects selected are ones not previously covered in lecture. Examples of these are root resorption. influence of endocrines, the impacted canine, the Wetzel Grid, and others.

Early in the junior year, second and third patients are assigned to the students. These cases usually involve cross-bites, inlockings, habits, space maintenance, serial extractions, and individual rotations. In certain instances, where a student is particularly interested and qualified, twin wire cases are assigned. The availability of two academic years for the treatment of his patients enables the student to complete, in nearly all instances, the problems assigned. The schedule allows Saturday mornings throughout the two years, and two half-days shared with operative dentistry and periodontia.

During the senior year, advanced subjects are introduced in the weekly seminars. Cephalometrics, cleft palate, surgical orthodontics, the temporomandibular articulation, systems of diagnosis, extractions and others are brought into focus, if not exhausted. An adequate bibliography is provided

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

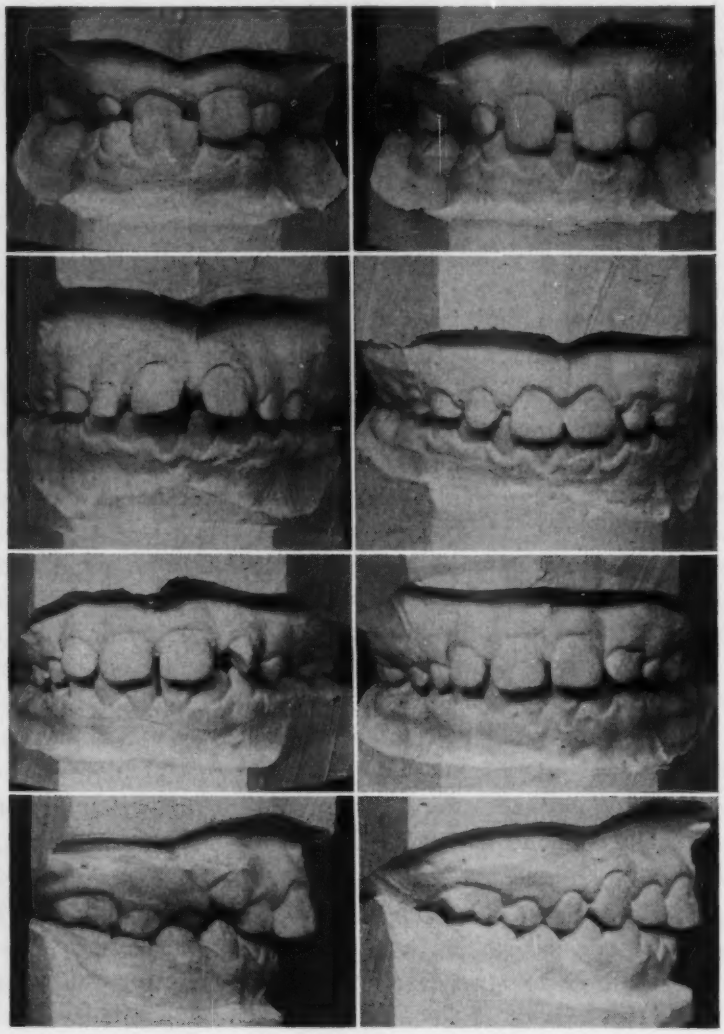

Fig. 1.—Anterior cross-bite. Treated with an individual bite plane.

Fig. 2.—Class I malocclusion with anterior protrusion of maxillary incisors. Treated with removable Hawley type appliance with anterior elastics.

Fig. 3.—Class I malocclusion with rotated maxillary left lateral incisor. Treated with an individual band and reciprocal wires to central incisor and canine.

Fig. 4.—Class II malocclusion with contraction of maxillary first premolar and mesioversion of maxillary canine. Treated with labiolingual appliance.

for the stimulated. During the latter part of the senior year, each student reports to his classmates, with the aid of slides, on one or more of his treated cases. These seminars are considered important teaching exercises. They serve to illustrate the objectives achieved, the mechanotherapy involved, and

the limitations of treatment, if any. They also provide an excellent opportunity for a review, and a trigger to set off discussions on basic principles and their application.

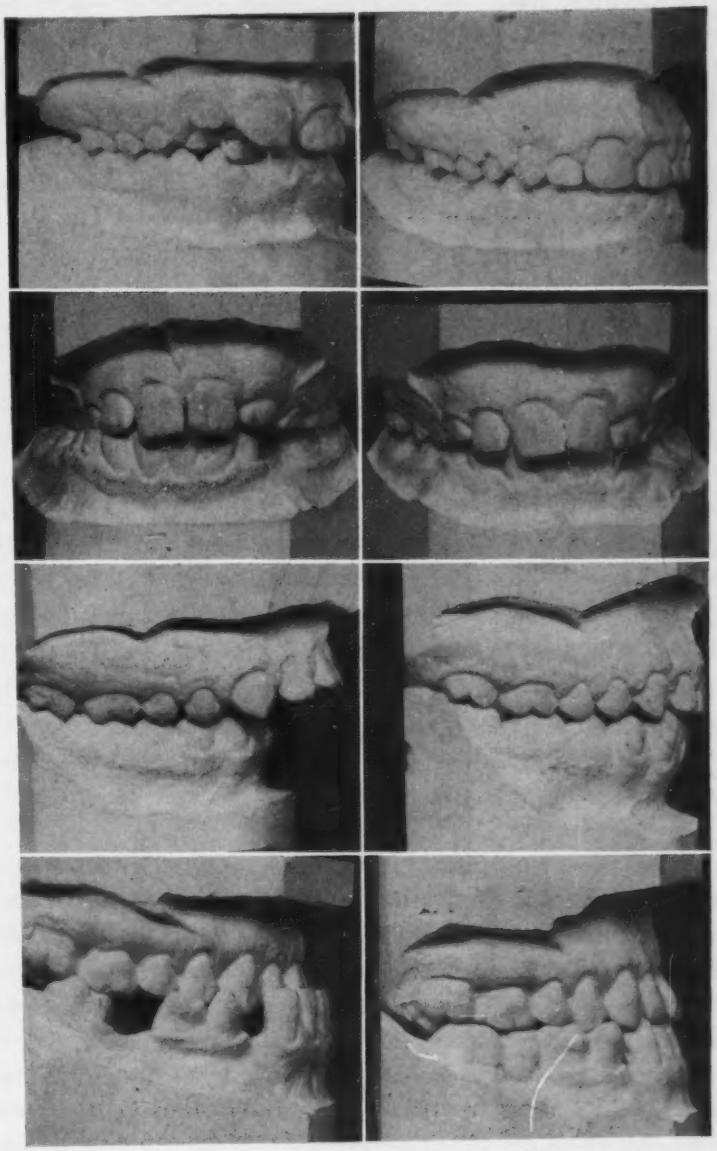

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 5.—Class I malocclusion with marked irregularity of maxillary incisors. Treated with Johnson twin wire.

Fig. 6.—Posterior cross-bite. Treated with maxillary lingual arch wire incorporating an expansion loop.

Fig. 7.—Class II malocclusion. Treated with Johnson twin wire.

Fig. 8.—Class III malocclusion. Treated with labiolingual and then fixed bridgework.

During the senior year, one academic week is spent at the Boston Children's Hospital. An opportunity is provided to observe a wide variety of patients under treatment ranging from the simple to the unusually complex.

The conditions of treatment and the method of patient handling are akin to that of a busy, well-run practice and provide some insight into this area. In addition, there are some special problems handled at the hospital which make for good teaching material. A cleft palate clinic is run by the department, where the orthodontic needs of the postoperative cleft palate patient are attended. Other needs of the cleft palate patient, such as speech therapy and surgery, are available for student inspection. The application of orthodontics to the treatment of fractures and to the surgical resection of mandibles may very well be in progress during the senior visit. The correlation between pedodontics and orthodontics is unusually well illustrated. The student circulates freely throughout the department where the major portion of the dental activities is concerned with the pedodontic problems.

During the two clinical years, a student is required to complete and report on an original research project. This requirement is under the direction of the very able basic research department at the school. In the latter part of the year, a day and a half is set aside in which each student reports on his findings to the assembled school. This meeting is conducted in a manner very similar to that of the research sections of our dental societies. Usually, one or more theses are selected within the Department of Orthodontics. When the late Charles Waldo was administrative head of orthodontics, the problems were related to tissue response to tooth movement under different experimental conditions. Of recent years, they have been concerned with growth and development, cleft palate, and experimental tooth movement.

Some examples of cases treated by students may be seen in Figs. 1 through 8. Each student treats at least three or four patients, while an unusual student may carry as many as five or six.

DISCUSSION

It has been noted in the introduction to this article, and reported elsewhere,[9-17] that the objectives and methods of teaching undergraduate orthodontics are both confused and controversial. The underlying philosophy and basic motivation for the course described rest on the premise that orthodontics is an important aspect of dentistry. It is gratifying to note that the program described in this article meets practically all the recommendations made by the Committee of Education of 1951[8] and summarized in the introduction. With the increased training in basic science in the undergraduate colleges and in the dental schools, it seems feasible to assume that the background material for orthodontics can be presented more rapidly, more critically, and with the expectation of being absorbed more readily.

One of the most important ingredients of the course is the treatment of patients by the students. This participation by the student gives the background material presented a pertinence, a relevance, and an interest which may very well be lacking in its absence. While a study of occlusion involving

growth and development and the maintenance of its functions is useful background material to all dentistry, it seems logical to assume that this material can be made vital and real by the student actually treating patients and seeing many more under treatment.

Under this program, a proper appreciation of the limitations of treatment is essential. During lectures, at chairside discussions, and at hospital visits, an opportunity is provided to present material and discussion to help build up this appreciation. In the senior year, some students usually report on cases in which they achieved limited objectives. The diagnostic and technical problems of realizing an ideal result (if possible) are pointed out. During examination mornings, difficult orthodontic cases are invariably present. This opportunity is seized to discuss and point out the difficulties of their treatment.

In order for this program to be implemented, it is essential that there be a small student-faculty ratio and that adequate time be made available from the curriculum. At Harvard we have a ratio of one orthodontic staff member to ten students. Approximately 340 hours are prescribed for orthodontic lectures and clinics, including demonstrations. This time is not exact for each student, since several variables are introduced. Some periods are shared with operative dentistry and periodontia. A student's needs in the latter subjects, coupled with his interest in orthodontics in the senior year, may lead him to spend more or less time on orthodontics.

The efficiency of teaching the dental disciplines at Harvard, as illustrated by Van Leeuwen,[18] is important in freeing sufficient time to make available the hours prescribed above. The cooperation of the dean and the Curriculum Committee are equally important. At the Harvard School of Dental Medicine, the student body has rallied to this program with rewarding enthusiasm and vigor.

SUMMARY AND CONCLUSIONS

A review of the teaching of undergraduate orthodontics is presented. A description of this course at the Harvard School of Dental Medicine is given in some detail.

It is felt that this undergraduate course enables each student to obtain a background in orthodontics befitting its position in dentistry. It is also felt that an understanding of occlusion, growth and development, and the maintenance and functions of occlusion can best be taught by having the student participate in some treatment. The ability to recognize malocclusions, to intercept and prevent certain malocclusions, and to treat simple cases are considered valuable assets to the student of dentistry.

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AN APPRAISAL OF STATUTORY LICENSING BOARDS COVERING ORTHODONTISTS

EARL R. CUNNINGHAM, D.D.S. AND HARRY H. SORRELS, D.D.S.
OKLAHOMA CITY, OKLA.

SINCE American orthodontics is controlled in nine states by a statutory licensing system, it seems pertinent that an appraisal of the demands of the respective state statutory requirements be made for the social and professional welfare of all engaged in the practice of orthodontics.

In appraising our laws, we must say, in passing, that there are two regulatory forces in action:

1. The moral law of ethics or self-imposed regulations, wherein the orthodontist agrees to certain principles of conduct conducive to the mutual welfare. This law is epitomized by the moral laws of man as laid down by our societies and the American Board of Orthodontics, where one can achieve recognition not only of excellence in the field of orthodontics, but also of character and where, after being judged, he is certified as a diplomate of the Board.
2. The second law, or statutory law, is imposed by the government of the people. In this instance, it is exercised by state statute.

It is with regard to this statute that the Oklahoma State Orthodontic Society felt that an appraisal of the various requirements of the different state laws would prove helpful, (1) so that the Society might have this knowledge well in mind in making any constructive recommendations or observations; (2) for the good of the Statutory Governing Board in appraising an applicant's qualifications with reasonable conformity to all the other states with regulatory laws; and (3) so that all members of the American Association of Orthodontists might be aware of these laws. Therefore, we submit them for your review.*

May we say further that it is our studied opinion that both these laws are very meritorious and that all orthodontists should lend their sympathetic support to both systems, since the objectives and purposes of both are fundamentally sound and do not conflict with each other.

*_Authors' Note:_ Since this brief explanation of the different states' requirements is, at best, only a partial quotation from the law, it is our recommendation that anyone wanting further information on the subject contact the secretary of each Board.

AN ANALYSIS OF THE REQUIREMENTS AND EXAMINATIONS OF STATES HAVING THE SPECIALISTS' CLAUSE FOR THE LIMITED PRACTICE OF ORTHODONTICS

STATE	REQUIREMENTS FOR TAKING EXAMINATION OR APPLYING FOR LICENSE	EXAMINATION GIVEN BY	TYPE OF EXAMINATION
Illinois	The Board is empowered to make higher standards for those limiting their practice; applicants must have practiced dentistry for 5 years before applying	The regular Board	At discretion of the Board as set up in standing rules
Kansas	45 semester hours of graduate training or equivalent	Orthodontist appointed by the Board	(1) *Theory:* Basic sciences and all subjects pertaining to orthodontics (2) *Practical:* 10 case reports or a master's thesis
Kentucky	The Board is empowered to make higher standards	Regular board; each specialty is assigned to 1 member and it is his responsibility to prepair the examination in that field; examination is studied and approved by entire Board; assistance from a practitioner in the specialty may be obtained	(1) *Theory:* 10 essay type questions (2) *Oral:* Applicant interviewed by 3 Board members (3) *Practical:* Applicant must submit x-rays, photographs, and models of 2 cases before the work was started, as well as photographs and models of the cases showing progression and completion; a complete history must be given, showing length of time devoted to each case; applicant must also present for examination to the members of the Board 2 patients under treatment; construct and place in the mouth part or all of the appliance necessary for the treatment of one case; applicant must submit 5 complete case histories including x-rays and models before and after treatment
Michigan	1 year of graduate training or equivalent	2 orthodontists appointed by the regular Board	(1) *Theory:* 15 essay type questions; 2 one-hour written essays (2) *Practical:* 1 case report with all records; also, model with appliances on it; cases for diagnosis; applicant must present patient with appliances on, and construct bands on patient
Nevada	Basic requirements: (1) Applicant must hold a license to practice dentistry in Nevada (2) Must have been in practice of dentistry for 3 years or more prior to making application for certificate to practice as a specialist (3) In the branch of dentistry to which he wishes to confine his practice, he must be a member in good standing of a national association, society, or group of specialists which is recognized by the regular Board	Regular Board	Any applicant for an orthodontic specialty license must be certified by the American Association of Orthodontics or the American Board of Orthodontics; either certification is accepted in lieu of an examination; a license is issued automatically; the Board reserves the right to require examination if, at some future date, the need for such is indicated

STATE	REQUIREMENTS FOR TAKING EXAMINATION OR APPLYING FOR LICENSE	EXAMINATION GIVEN BY	TYPE OF EXAMINATION
Oklahoma	30 semester hours of graduate training or the equivalent	Committee of 4 orthodontists, appointed by president of state orthodontic society and approved by regular Board	(1) *Theory:* 60 essay and objective type questions pertaining directly to orthodontics and associated subjects (2) *Practical:* A typodont setup for treating a Class II, Division 1 malocclusion, appliances constructed by applicant; complete records for 2 cases with written diagnosis (3) *Oral:* Diagnosis of 4 cases (1 from each examiner), with discussion and questions
South Carolina	Specialist law requires applicants to be prepared and this is determined by examination	Orthodontist designated by Board to supply questions and grade papers	Information not given
Tennessee	1. Applicant shall have been in practice of dentistry for 3 years or more 2. 1 year's graduate training, or 1 of the following alternates: (a) 2 years as instructor (clinical) or intern in subject (b) 1 year full-time teacher in subject in accredited school or 2 years as half-time teacher (c) 3 years' preceptorship in office of certified specialist (d) 12 years' special attention in practice (e) Certificate of American Board of Orthodontics (f) Certificate to practice in another state having specialists' clause	Regular Board	X-rays, photographs, and models of cases before and after treatment, with complete history giving length of treatment; applicant must construct appliances on models for actual and for technique case; applicant must present 2 patients under treatment for examination by Board; may be requested to construct and insert appliances in these patients
West Virginia	The Board is empowered to make higher standards	The regular Board may give the examination and seek qualified assistance	*Theory:* Basic sciences and all subjects pertaining to orthodontics *Practical:* Can or may consist of clinical procedure on patients or laboratory work *Thesis:* May be required in certain instances

Orthodontic Profiles

EDWARD H. ANGLE

DR. ANGLE was a genius, essentially a mechanical genius, and someone has said that the essence of genius is sweat. This can be illustrated by the story Mrs. Angle told me: "Dr. Angle was working on the ribbon arch appliance and had been for some time. Very early one morning, about three or four o'clock, he jumped out of bed, threw on a bathrobe and went to his bench and started to work. He never left it for forty-eight hours. From time to time I brought him something to eat and at the end of that time he had completely formed in metal the bracket for the ribbon arch band." I was present at the meeting in New London when Dr. Angle presented this appliance to his students. For two days he kept them at their benches, drilling them on the technique of the ribbon arch. At the end of that time, he said, "Gentlemen, this appliance will do anything that can be done in orthodontia. Now, for God's sake, learn to use it." But he was never satisfied with anything he produced. He would immediately see the defects and difficulties and try to eliminate them.

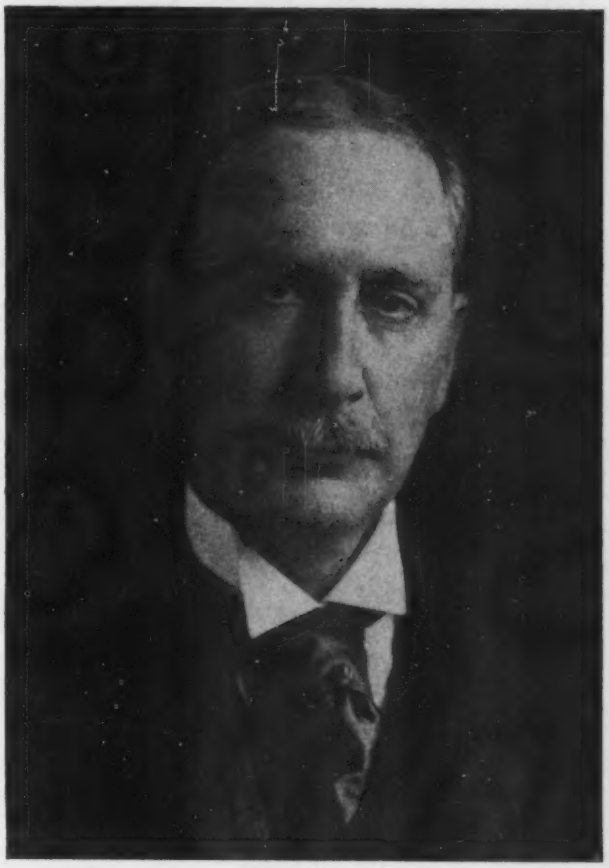
Dr. Angle was a most tragic character, for his nature was a mixture of the most violently opposite and contending qualities. He was a man of great intensity. When he worked he worked with all his might and when he played he could play with complete abandon. At the end of one of the New London, Connecticut, meetings, after lecturing for two or three hours in the morning and supervising technique in the afternoon, he and Mrs. Angle got into their car (he always had a chauffeur), he thrust his feet up on the back of the front seat, and drove through the staid and sedate New England villages singing, at the top of his voice, "My Irene Was the Village Queen, She Was the Queen of the Village Green."

Dr. Angle had a very fine collection of Southwest Indian beadwork. I have a picture of him and Dr. Oppenheim dressed in Indian costume—beadwork vests and all. His collection of Southwest Indian blankets (or rugs) was one of the finest ever assembled. I have said that he worshiped perfection and he was never interested in anything unless it was the best of its kind. He could never take criticism or argument. I once told a young man who stopped on his way to Dr. Angle's, "Do not ask questions or try to argue; just sit and take everything he has to give, then go home and think about it."

Being a genius, he could never defend his own ideas. The logical steps by which he arrived at them had all been in his subconscious mind; therefore, he could not explain just how he arrived at them. He knew that they were

right. He would go to a dental meeting and present his ideas; then one man after another would get up and attack them, and all he could do was call them fools. That is why he needed men like Gruenberg and Oppenheim in Europe and Atkinson and Brodie in this country to defend and develop his ideas.

To the dentist, the individual tooth was the important thing, but Dr. Angle discovered the very important concept that the tooth was only a unit of structure, as a brick is a unit in the structure of an arch, and that the entire denture was the unit which was damaged more or less seriously by the extraction of a single tooth.



EDWARD H. ANGLE

Dr. Angle was a great teacher, but he violated all the orthodox rules of teaching. Socrates and Plato and many of the great teachers had conversation and discussion with their pupils, Angle never discussed a matter with his pupils; he told them, and the remarkable thing was that, with very few exceptions, he changed those men for life. Dr. E. C. Kirk, dean of the University of Pennsylvania, once asked a student who had just returned from Dr. Angle, "What is there about that man that he can take one of you ordinary guys and make of him an ardent student, a tireless worker, and always keen for the development of his specialty?"

There was something about the man that enabled him to awaken interest, arouse enthusiasm, and stir a man to real effort. Students left him feeling that orthodontia was the greatest profession on earth and that their heart's desire was to develop it and make it better. If Dr. Angle really liked a man, he would ride him unmercifully. His object was to see if he was man enough to take it; if he was not, he dropped him from the course but if he was, he gave him all that he could take. At one time he visited the office of one of his students and found that he had slipped back into old methods of practice. At the end of the day he took him over to his hotel room and gave him a tremendous tongue lashing and then went home to New London and was sick for two weeks.

In his teaching he had always used the Venus de Milo and Apollo Belvedere as examples of perfect faces and he asked Professor Wuerpel if he could give him a better model. Wuerpel talked with him for two hours and explained that no single face could be the ideal face or was the pattern to be approached in orthodontic treatment. There were many face patterns, and the object to be attained was to develop in each patient, as perfectly as possible, the type that his heredity had given him. Speaking of this interview, Dr. Angle said, "I was dripping perspiration all over and I turned to Professor Wuerpel and said, 'Will you come over and tell that to my students?' " He did, and Professor Wuerpel had a profound effect on the development of the practice of orthodontia.

Dr. Angle was always looking for new men to supplement his teaching. In all his later courses he brought in some rhinologist to point out the effects of orthodontic treatment on the development of the nasal spaces and the respiratory functions. He was especially interested in the development of the lip muscles in normal breathing.

The making of appliances for the movement of crooked and disfiguring teeth goes far back in the history of dentistry, and there are large volumes made up almost entirely of descriptions of devices for the moving of teeth. Each case was considered as a problem in itself, and a device was invented for its treatment. Dr. Angle realized that all that could be done to a tooth was to push, pull, or twist it, and that it should be possible to invent a comparatively simple device that would do all these things. He invented such an appliance; the items were fastened on a card. At first Dr. Angle, with the help of a technician, made the appliances and turned them over to the S. S. White Dental Manufacturing Company, for sale on commission. The members of the dental profession were unsuccessful in using this appliance and he realized that, if he was to have any sale for it, he must train men to use it. That was the beginning of his teaching and of the concept of orthodontia as an independent specialty.

Dr. Angle was a great man, and the dental profession and all humanity owe him a great debt.

Frederick B. Noyes

In Memoriam

BARNEY C. COOKSEY
1901-1956

BARNEY C. COOKSEY died in Sherman, Texas, on Dec. 23, 1956. Born in Turnerville, Texas, on Sept. 28, 1901, he came to Sherman in 1945 following his discharge as a major in the Air Force. He was the son of Mrs. Gertrude Cooksey of Waco and the late W. S. Cooksey. On Dec. 24, 1946, he married Miss Ethel Stuart in Sherman.

Dr. Cooksey attended Austin College before entering Baylor University. He was a graduate of Northwestern Dental College and did graduate work at the University of Toronto and the Charles H. Tweed Foundation for Orthodontic Research in Tucson, Arizona.

Dr. Cooksey was a deacon in the First Presbyterian Church. He held memberships in the American and Southwestern Societies of Orthodontists, Charles H. Tweed Foundation for Orthodontic Research, Texas Tweed Study Group, and the American and Fourth District Dental Societies.

Dr. Cooksey was past-president of the Grayson County Society for Crippled Children. He served two years, and it was during his tenure that the exceptional children's class program was adopted and made a part of the school system.

He is survived by his wife, his mother, a brother, N. J. Cooksey of Moberly, Missouri, and a sister, Mrs. Barton Atkinson of Waco, Texas, to whom our sincere sympathies are extended.

ELBE B. PULLIAM, Chairman
Necrology Committee
Southwestern Society
of Orthodontists

Department of Orthodontic Abstracts and Reviews

Edited by
DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

La Methode de J. E. Johnson (The Johnson Method). Twin Wire Arch. By Paul Geoffrion, Professeur Titulaire d'Orthopedie Dento-Faciale et Vice-Doyen de la Faculte de Chirurgie Dentaire de l'Universite de Montreal (Canada). Preface by A. Beauregardt, Professeur d'Orthopedie Dento-Faciale a l'Ecole Dentaire de Paris. Published by Julien Prelat, Paris, France, 1956. 174 pages. Illustrated.

Professor Paul Geoffrion, the author of this book, has long been known to American orthodontists as an energetic and progressive educator in both undergraduate and postgraduate education. This text is published in the French language. However, it will prove useful to those who are not acquainted with this language because of the 110 excellent illustrations, each with an explanation in French, English, German, Spanish, and Italian.

The basis of the Johnson twin wire appliance is explained and illustrated, as are its various elements, including the newer locks and brackets. Coil springs, as used with the twin arch appliance, are illustrated and discussed in some detail. Construction of bands, including anterior as well as posterior ones, and soldering of attachments are presented in a brief and clear manner. Arch construction and adaptation are fully explained, and the stabilizing plate is discussed.

Part two is devoted to the explanation of practical cases according to the Angle classification. The author begins with treatment of simple cases and progresses to the more complicated types of malocclusion. Rotation of teeth is explained, as are open-bite and deep overbite cases. A valuable chapter is the one on treatment of extraction cases with the twin wire appliance.

The author has presented the Johnson twin arch mechanism in a succinct, easy-to-follow manner. The illustrations are exceptionally well prepared and the explanations are given in sufficient detail.

J. A. S.

The Aetiology of Irregularities and Malocclusion of the Teeth. By James C. Brash, Emeritus Professor of Anatomy, The University of Edinburgh; H. T. A. McKeag, Reader in Orthodontics, The Queen's University, Belfast; and James H. Scott, Lecturer in Anatomy for dental students, The Queen's University, Belfast. Published by the Dental Board of the United Kingdom, London, England. Price, 2 Guineas.

This volume is, by all odds, the most comprehensive work in the field of etiology that has appeared, and no review of it could do more than to indicate its organization and scope.

The work is published as a second edition of Brash's contribution of 1929 but, in reality, it is a reprinting of the earlier book with a second part contributed by McKeag and Scott. There is also appended a section by Miriam Tildesley concerning orthodontic problems and their solution which accompanied Brash's 1929 publication, and which is also a reprinting. The whole makes up a volume of 458 pages, exclusive of 29 pages of bibliography; there are 235 illustrations.

Part I, by Brash, needs no review, since it has been in circulation for over twenty-five years, but one statement in the summary is worth recalling: "The attitude adopted in these lectures . . . is that of stocktaking, not with the object of propounding a solution or finding the cause or causes of these conditions, but of reviewing the evidence of the participation of probable factors, assessing their probable relative importance in a biological problem and indicating the lines on which fresh investigations should proceed."

Part II of the combined work was prepared in a manner similar to that of the first part in that it is a review of all important research in the field of etiology *since* 1929. However, it is the result of a joint effort by an orthodontist and an anatomist, and this has resulted in a point of view somewhat different from that of Brash, a point of view that shows the leavening effect of a basic science discipline on the clinical attitude and vice versa. Orthodontists will be pleased with one sentence in the introduction which states: "Incidentally, we are glad to record our view that orthodontic literature now shows at least as high a proportion of scientific articles as that of any clinical subject we have examined; that is, articles in which a clear-cut hypothesis is critically tested."

Excluding the summaries by each of the joint authors, there are twenty chapters in Part II and, as might be expected from the sharp increase in research efforts since 1929, they are more inclusive and detailed than those covering the earlier period. Among the fields reviewed are those pertaining to fundamental work on bone and muscle, growth of the jaws and face, the development of occlusion, the incidence of malocclusion in the adult, mixed and deciduous dentitions, genetics of malocclusion, congenital malformations, effects of illness and nutrition, order and timing of eruption, endocrine experimentation, pathologic conditions associated with deformities of facial growth and development, etc. The final chapters find the authors dealing with normal and abnormal growth in animals through variation, hybridization, and domestication and with racial and evolutionary trends and tendencies in the human being.

This work cannot be too highly recommended to the researcher, the thoughtful practitioner, or the student of orthodontics. In addition to the critical light it casts on modern theories and concepts, it points out the areas in which investigations might be fruitful and even suggests general approaches to some of the unsolved problems of orthodontics. The bibliography is comprehensive and up to date, and would constitute a worthy source of reference in any orthodontic library.

Allan G. Brodie.

Speech Articulation Problems Associated With Placement of Orthodontic Appliances. By Eugene W. Feldman, B.S., D.D.S., M.S., Lewistown, Pennsylvania. *J. Speech and Hearing Disorders* **21**: 34-38, March, 1956.

It was the purpose of this study to examine the effect on speech of the insertion of orthodontic appliances. Thirty-two patients from an age range of 9 to 18 years were selected from the Orthodontic Department of the School

of Dentistry of the University of Pittsburgh. The type of malocclusion presented by any one patient was disregarded as being immaterial to a study of this type. Two groups of patients were used: (1) those with bite planes or Hawley retainers, and (2) those with labiolingual appliances or labiolingual with Johnson appliances.

Three articulation tests were given to each patient. The first test was given before appliances were inserted, the second test was given within an hour after insertion, and the third test was given after the patient had worn the appliances for one to three weeks. The tests were transcribed by two judges, graduate students in the Department of Speech, either from direct speech or from a tape recording.

For all patients as a group, regardless of the appliance worn, comparisons were made between Test 1 and Test 2, and between Test 2 and Test 3. Further, a comparison was made on Test 2 between the group wearing bite planes or retainers and the group wearing either the labiolingual or labiolingual with Johnson appliances.

It was found that patients with either bite planes or retainers were more likely to make errors within an hour after placement than were patients with labiolingual or labiolingual with Johnson appliances. However, regardless of the appliances worn, any resulting articulatory difficulties were overcome, almost if not entirely, within a short time.

Orthodontic appliances in some instances can alter patterns of speech temporarily, but at the end of one to three weeks the patient apparently accommodates for their presence and overcomes any hindrances caused by the appliances.

According to the findings of this study, it does not seem necessary to have patients take any particular speech training exercises while undergoing orthodontic treatment; patients easily accommodate, without instruction, to the presence of interferences with the tongue, lips, hard palate, mandible, or teeth.

The Physical Growth of Children: An Appraisal of Studies, 1950-1955. By Wilton Marion Krogman, Philadelphia Center for Research in Child Growth, University of Pennsylvania. Monograph of the Society for Research in Child Development, Inc. Vol. 20. Serial No. 60, No. 1, 1955. Published by Child Development Publications, Purdue University, Lafayette, Ind., 1956.

In reviewing the literature on the physical growth of children during the period covered by this monograph, Krogman states, "One is struck by an atmosphere of ferment and discontent." This may be applied as well to the contributions on cephalometrics. Certain contributions in recent years, however, seem to fit into the mosaic which is taking shape. Krogman, with an experienced eye, includes and evaluates the significant work which has been added.

Among the subjects reviewed are height and weight studies, including proportional increase; ethnic differences; the use of the Wetzel Grid; and the relation of body type to height and weight. Bone growth and skeletal maturation have received renewed attention.

Krogman's evaluation of the various studies on physical growth should be required reading for all practitioners of orthodontics. He presents five reasons why the study of human growth is important. These include the determination of (1) health and nutritional status; (2) the progress of growth; (3) comparison of growth increments; (4) data on family-line studies, and

(5) the range of variability in the individual child in comparison to norms or standards. A major flaw of cross-sectional studies, Krogman finds, is that they yield only "average" values.

J. A. S.

Congenital Dentofacial Malformations in Rats Induced by Maternal Nutritional Deficiency: A Cephalometric Appraisal. By Frederick M. Deuschle and Josef Warkany. *J. D. Res.* **35**: 674-684, October, 1956.

Prenatal, intrauterine environment influences embryonic growth and differentiation not merely by gross mechanical forces, but also by more subtle chemical, nutritional, toxic, or actinic processes. The organism which presents itself at birth is a product of genetic and prenatal environmental factors. Postnatally, the growing structures are further subjected to a host of environmental forces. By the time the teeth erupt, the dentofacial relations have become dependent upon so many interacting processes that analysis of anomalies has become difficult. Often it is impossible to establish which factors are primary, secondary, or tertiary in the production of dentofacial disorders.

Congenital malformations in the jaws of experimental animals offer material for analysis which is free of postnatal influences. In the newborn, a syndrome of skeletal malformations was induced by maternal riboflavin deficiency. A definite pattern of anomalies of the jaws and teeth is included in this syndrome. Shortness of the mandible and maxilla, cleft palate, and severe anomalies of the incisor teeth are observed. The skeletal malformations are determined before chondrification and ossification take place.

To compare the basic facial patterns, this study employs measurements of angles and angular relationships instead of estimations of linear dimensions.

There is only a slight shortening of the upper jaw, but a marked reduction of the mandibular corpus. The chief loss affects the interdental diastema, which appears reduced in length and in height. The loss of height can be attributed to failure of development of the upper border, while the lower border of the corpus is continuous with that of the ramus as in the normal. The ramus, with its coronoid, condyloid, and angular processes, shows no aberrant development. The bones of the orbit and of the calvarium appear normal.

Upon the photographs of cleared animals, maxillofacial triangles were traced using the following three sides: (1) Bolton plane as the cranial base line (BN); (2) facial line (NM) from nasion to the inferior alveolar point (IA); and (3) the mandibular line (MB), a tangent to the inferior border of the mandible continued anteriorly to meet the facial line at M and posteriorly to the cranial base line at B. Three additional lines were drawn from nasion—one to the superior alveolar point or prothion (P), another to the anterior inferior molar point (A), and a third to the internal angle point of the mandible (I). All the angles at N and the angle at B were measured in the control and abnormal animals.

In the control animal, the upper incisor is surrounded by osseous premaxillary tissue and the lower incisor is completely encased in the osseous mandible. The nasopharyngeal duct is separated from the oral cavity by the hard and soft palates. The tongue is well within the oral cavity. In the abnormal animal, the premaxillary area shows definite shortening and the section of the upper incisor tooth is changed in outline. This is due to an altered dentoalveolar relationship. A slight retrognathia of the mandible can be noticed; the lower incisor is small and shows evidence of malformations. The

osseous structure of the mandible is hypoplastic. The tongue protrudes between the lips. No lower incisor tooth is present, and the mandible is reduced in height. The premaxillary region is greatly underdeveloped and does not contain an incisor tooth. There is also a marked reduction in the soft tissues of this area, which results in vertical shortening of the upper lip.

In the control animal A, angle IANB is 70 degrees. The corresponding angle in the abnormal animal B is 67 degrees; in the abnormal animals C and D it is 50 degrees. The maximal loss of angle IANB in the series of abnormal animals is 20 degrees, or 29 per cent. The other facial angle PNB is 108 degrees in the control animal; it is 95 degrees in the abnormal animal B, 95 degrees in C, and 93 degrees in D. The maximal loss of this angle in the series of abnormal animals is 15 degrees, or 14 per cent.

The fact that an experimental method results in the production of certain malformations in animals does not permit the conclusion that similar defects in man are due to similar causes. In fact, congenital dentofacial anomalies can be induced now in mammals by a variety of experimental methods; they can be obtained also without experimentation, by breeding animals with abnormal genetic endowment. It is very likely that comparable anomalies occurring in man are also attributable to a variety of factors, rather than to a single cause. It should be recognized that abnormal prenatal development may be due to the abnormal genetic constitution of the organism in some cases and to prenatal environmental changes in others. Congenital malformations should be considered as symptoms of prenatal pathologic changes, and not as etiological entities. This concept is probably the most important result of the teratologic experiments performed on mammals in recent years. If this principle is clearly understood, certain aspects of animal experiments can be used to illustrate the mechanisms which lead to congenital malformations in man.

In the experiments described in the article, the entire embryo develops throughout gestation in an abnormal chemical environment created by a dietary deficiency of the mother. It is of interest that, under such experimental conditions, the skeleton is chiefly affected and that different parts of it suffer to a different degree. The axial skeleton and proximal parts of the appendicular skeleton are much less modified than distal structures.

The angular relationships are partly changed and partly unaffected by the experimental conditions. Angle PNB, the facial angle which characterizes the position of the prothion, is only moderately reduced by the retarding process. In all the deficient young described, the maximal reduction is found in angle MNA, which indicates that the premolar mandible is most severely affected. In the rat, the bone about the lower incisor teeth may be looked upon as alveolar process. If this is true, the great reduction in mandibular length is partly due to failure of development of alveolar process. As indicated by angle ANI, the molar corpus is markedly reduced, though less so than the premolar corpus.

In contrast, angle INB is hardly affected by the deficiency. This fact, as well as the results of histologic studies, indicates that the ramus is almost normally developed in the anteroposterior direction. Angle NBM, which represents the relationship of the cranial base to the inferior border of the mandible, also remains unchanged in the abnormal young. This finding indicates normal vertical development of the ramus.

Acute teratogenic experiments which injure the developing embryo at critical periods result in specific malformations because the insult interferes with differentiation of parts which are rapidly growing at the time of the injury. Parts which are at rest at this time are spared. The specific effects

of chronic anomalies of the environment can be explained only by the assumption that during certain phases of development the affected areas have special nutritional requirements which are not met under the experimental conditions. In this respect—and only in this respect—the experiments of nutritional deficiency resemble genetic deficiencies. An abnormal gene stays with the organism throughout life, but it manifests itself at critical periods only.

Disproportional development of the components of the facial skeleton often is a major causative factor in the production of malocclusion. In the experimental animals the reduction in size of the maxilla and the mandible are not proportionate. Therefore, malocclusion must be expected. If it is permissible to classify the malrelationship of the jaws and the "malocclusion" of the unerupted teeth in the deficient neonates, using Angle's human classification, it might be said that they resemble Class II malocclusion. The mandibular arch is in a posterior relationship to the maxillary arch. The lower molar teeth and the upper incisors, which are all unerupted, also show a position posterior to normal.

It should be of interest to the orthodontist that such severe dentofacial malrelationships can be induced by prenatal environmental factors. The malocclusions seen in later life and often referred to postnatal factors may actually originate in prenatal life.

Abstracts Presented Before the Research Section of the American Association of Orthodontists, Boston, May 1, 1956

A Study in the Development of an Electronic Technique to Measure the Forces Exerted on the Dentition by the Perioral and Lingual Musculature: By Robert Y. Winders, D.D.S., Northwestern University Dental School, Chicago, Illinois.

In this study, a technique was devised in which the SR4 resistance strain gauge could be utilized in the construction of a transducer element capable of registering the pressures of the perioral and lingual musculature. The gauge carrier, together with the elastic unit, was constructed of gold and a brush strain analyzer and a direct inking oscillograph were used for the recording equipment. Seven young adult males with clinically excellent occlusion were investigated. Five areas of the mouth were surveyed, two of which were bilateral areas. After an appraisal of resting pressure was made in each area, four functional exercises were introduced—swallowing, sucking, speech, and maximum effort. Each of these exercises was repeated three times, and after replacement of the transducer element the series was again repeated.

The permanent oscillograph records which were obtained showed similar patterns between the subjects. There appeared to be an increase of pressure on the lingual side of the dentition during the swallowing exercises, with no increase registered by the buccal musculature. The pressures exerted by the upper lip and tongue during the speech exercise were greater than those exerted by the buccal musculature. The tongue was capable of exerting more pressure on the dentition during the maximum effort than the buccal musculature. The pressures as recorded on the oscillograph records were interpreted in terms of grams and these numerical values were subjected to a statistical analysis of variance. The results of this investigation seemed to indicate that the lingual musculature exerts more pressure on the dentition than the buccal musculature during the various functional exercises.

Young Adult Facial Quadrilateral Measurement Standards: By Thomas McBride Wilson, D.D.S., University of North Carolina, Chapel Hill, North Carolina.

The purpose of this study is to compile a set of normal standards for young adults, based on constructed quadrilaterals obtained from tracings of profile cephalograms. These are to be used in diagnosis to determine deviations from the normal.

Forty men and forty women with excellent occlusion and pleasing facial balance were selected as the subjects.

From the data collected, mean linear and angular measurements were compiled and a quadrilateral was constructed for each sex.

If the angular and linear measurements of these constructed quadrilaterals could be accepted as normal standards, it is proposed that they be made into transparencies to be used as an aid for a quick and relatively simple method of evaluating certain profile linear and angular measurements of the face.

Skeletal Patterns in Class II, Division 2 Malocclusions: By James L. Wilson, Jr., D.D.S., Indiana University, Bloomington, Indiana.

This research is a cephalometric appraisal, using lateral headplate tracings and measurements according to the technique of Downs, of the skeletal patterns of a sample of fifty-eight unmutilated Class II, Division 2 malocclusions, noting the variations and tendencies exhibited herein.

The findings were plotted individually on Indiana polygons and also superimposed by projection on a master polygon.

As an index of relative anteroposterior maxillary and mandibular positioning, the angles Sella-Nasion to point A and Sella-Nasion to point B, and the differences between them, were also calculated.

The superimposed skeletal pattern measurements plotted on the master polygon show a striking and unmistakable trend toward the retrognathic side.

Three typical general types could be defined: twenty-seven cases were definitely grouped along the retrognathic side of the polygon with similar geometric figures; a second group of sixteen stepped out of the bounds of the polygon in all skeletal readings; a third group of fifteen was well inside the polygon, but with great diversity of geometric configurations.

There was great variability in the skeletal patterns of these cases, with no apparent correlation between the clinical classification or nomenclature and the findings. There *is* some correlation between sex and the skeletal pattern, however.

The area of greatest variability occurs in the relationship of points A and B to cranial base.

Some of these cases presented skeletal patterns that could be considered normal; forty-three of the cases showed skeletal patterns that were dysplasias, or true so-called Class II skeletal patterns.

Surface Changes Resulting From Passivation of Rustless Metals: By Herbert D. Ayers, Jr., D.D.S., and Saul M. Bien, B.A., D.D.S., School of Dental and Oral Surgery, Columbia University, New York, New York.

Although rustless metals show great tissue tolerance when used in contact with body fluids, they are subject to stress corrosion, crevice corrosion, and intergranular corrosion. Passivation in certain acids or acid mixtures containing oxidizing agents, or by electrical anodization, is used to reduce the

magnitude of such corrosion. Samples of U. S. S. type 304 and nickel-chromium 80/20 were immersed in a solution made up of 8 Gm. ferric sulfate (anhydrous), 4 Gm. sodium fluoride, 10 c.c. sulfuric acid (conc.), and 90 c.c. water at room temperature for ten minutes. Other samples of U. S. S. 18/8 type 304 and nickel-chromium 80/20 were used as anode in a solution of 90 c.c. phosphoric acid (conc.), 30 c.c. glycerine, and 30 c.c. water contained in a stainless steel dish acting as cathode with a current supply of 12 volts and 10 amperes. All specimens were mounted in acrylic and polished with abrasive paper, followed by aluminum oxide in water, and examined. Photomicrographs and preliminary report on the surface changes on U. S. S. 18/8 type 304 and nickel-chromium 80/20 after electrical and chemical passivation follow.

A Study of Brazed Joints After Electrical Passivation: By Saul M. Bien, B.A., D.D.S., and Herbert D. Ayers, Jr., D.D.S., School of Dental and Oral Surgery, Columbia University, New York, New York.

Brazed or soldered metals are usually cleaned of scale, oxides, and flux residues by chemical, electrical, or mechanical processes or by a combination of any of these. In previous studies, crevice corrosion resulting from a form of chemical pickling and passivation has been demonstrated. In this present study, samples of brazed joints of U. S. S. 18/8 type 304 with silver-copper-zinc-nickel solder were cleaned and passivated electrically. The samples were immersed as anode in a solution of 90 c.c. phosphoric acid (conc.), 30 c.c. glycerine, and 30 c.c. water contained in a stainless steel dish which acted as cathode with a current supply of 12 volts and 10 amperes. Certain of the samples show the formation of a shallow depression in the rustless metal directly adjoining the solder-rustless metal junction. The other samples show crevice corrosion. It is indicated by this study that rustless metal orthodontic appliances, after being brazed, should not be passivated electrically.

A Study of the Angular Relationships of the Sella Nasion and Frankfort Planes to One Another and to the Facial Plane of the Skull: By David Craig Hamilton, D.D.S., University of North Carolina, Chapel Hill, North Carolina.

Using eighty young adults with pleasing facial characteristics and good occlusion, a cephalometric radiographic investigation was undertaken to determine the relationship of two horizontal planes of the skull—sella nasion and Frankfort horizontal—to one another. The effect of their relationship on the results of measurements to the vertical facial plane was also explored.

The conclusions were as follows:

1. Considerable variation in the angular relationship of these planes to one another existed in the groups studied.
2. Because of this variation, an assessment of dental or dentofacial relations based on the angulation of only one of these planes to vertical planes might be misleading.
3. An assessment based upon correlations which were shown to exist between these variations and the measurements of angles with the vertical planes might be desirable.
4. Further study along these lines is indicated.

A Study of the "Acid Production Potential" of Salivary Sediment and Over-All Buffering Capacity of Supernatant Liquid of Patients, Untreated and Undergoing Orthodontic Treatment: By Arnold E. Bender, D.M.D., Tufts University, Boston, Massachusetts.

Paraffin-stimulated salivary samples are collected from a nonorthodontically treated control group of dental patients and from patients undergoing orthodontic treatment with intraoral appliances.

The sediments, after centrifugation, are resuspended in a 10 per cent glucose solution and pH readings are taken from 0 to 30 minutes' incubation time at five-minute intervals.

The supernatants are titrated with standardized NaOH and HCl solutions, and continuous pH readings are taken from the original pH to pH 10, back to pH 2 and then up to pH 7.

Findings are analyzed as to significance of differences between "acid production potentials" of the sediments, and the supernatants are compared as to over-all buffering capacity of the two groups.

No control of dentifrice used or of the time of collection is attempted, but these facts are recorded.

An Electromyographic Comparison of Excellent Anatomic Occlusion Subjects and Angle Class III Subjects (Masseter and Suprahyoid Muscles): By Robert C. Blenkner, D.D.S., Northwestern University Dental School, Chicago, Illinois.

Five subjects with excellent anatomic occlusion of the teeth were compared, electromyographically, to five subjects with Class III malocclusion. Periods of muscle activity or "envelopes" were measured and the percentage of chewing cycle time consumed by each envelope was computed. These percentage figures were subjected to an analysis of variance. Further evaluation of the electromyographic records was made by close study and gross observation.

No evidence, direct or projected. suggested that the suprahyroid musculature is primarily responsible for lateral movements of the mandible during mastication.

No clear-cut difference between the two groups was found. The records of each group ranged from a registration of good synchrony, and "clean"-appearing records to a definite lack of synchrony, a great deal of extraneous activity, and poor coordination.

This indicates that the improper relationship of the maxilla to the mandible in Class III subjects does not affect the suprahyoid and masseter muscle activity adversely when a harmonious functional occlusion is present. Disharmony of intermaxillary tooth contact during function, rather than the adverse relationship of the skeletal parts of the facial complex per se, may be the cause of the poor muscle pattern found in some Class III subjects.

Comparison of Malocclusion and Acceptable Integumental Profiles: By Charles J. Burstone, D.D.S., Indiana University, Bloomington, Indiana.

One hundred six malocclusion profiles were divided into groups based on Angle classification (Class I—46; Class II, Division 1—38; Class II, Division 2—8; Class III—14) and compared to forty esthetically acceptable faces. The mean ages for the malocclusion group and the acceptable control group are 13.6 and 23.8 years, respectively. Angular measurements were taken from lateral headplates and significant differences ("+" test) between the two samples were

determined. Since these differences represent age as well as malocclusion differences, further study of aging changes in the integumental profile can more specifically define the nature of facial deformity in malocclusion. A summary, by class, of significant differences between malocclusions and acceptable faces follows.

Class I:

1. Upper facial protrusion.
2. Retrognathism.
3. Mandibular retrusion.
4. Supramental retrusion.

Class II, Division 1:

1. Upper facial protrusion.
2. Retrognathism.
3. Maxillary protrusion.
4. Mandibular retrusion.
5. Interlabial retrusion.
6. Inferior labial protrusion.
7. Supramental retrusion.

Class II, Division 2:

1. Upper facial protrusion.
2. Retrognathism.
3. Mandibular retrusion.
4. Interlabial retrusion.
5. Supramental retrusion.

Class III:

1. Prognathism.
2. Supramental protrusion.

Variation, however, within each of the Angle classes is so great as to negate the usefulness of generalizations of facial form from the class.

Growth in Width of the Head of the Macaca Rhesus as Revealed by Vital Staining: By Arthur H. Craven, D.D.S, McGill University, Montreal, Quebec.

Two Macaca rhesus monkeys, corresponding in dental age to a 5-year-old child, were injected with a 2 per cent solution of alizarin red S at monthly intervals for two months. The skulls were macerated and embedded, intact, in a polyester plastic, "Castolite." One of the skulls was sectioned in a coronal plane at right angles to the eye-ear plane (Frankfort plane). Surface cutting and standardized photography were employed in a manner similar to that described by Moore in 1949. The other skull was sectioned by a band saw at the most interesting sites revealed by surface cutting.

Growth of the cranial vault was associated with sutural addition and the deposition of bone on the inner surface of the cranium. Increase in width of the cranial base contributed to lateral movement of the temporal bones. There appeared to be a relationship between separation of the glenoid fossae, due to growth of the cranial base, and the increase in width between the growing mandibular condyles. Increase in width of the facial structures was due to

both surface and sutural growth. The latter was particularly evident at the frontozygomatic and zygomaticomaxillary sutures, contributing to lateral movement of the zygomata, while surface addition of bone was noticed on the oral surface of the palate and lateral surfaces of the premaxilla and maxillae.

Increments in width of the mandible were mainly surface additions to the lateral edges of the posterior borders of the ascending rami together with upward and outward growth of the condyles in a manner similar to the growing ends of long bones.

News and Notes

Scientific Program and Other Related Activities for the Meeting of the American Association of Orthodontists, May 12-16, 1957, Roosevelt Hotel, New Orleans, La.

The sustaining strength of a professional society such as the American Association of Orthodontists lies in the sense of objective realism to be found in the scientific program. The good name of a society is determined by its essays, clinics, conferences, and discussions, and these, to a considerable degree, by the quality and standards of the participants. These facts influence substantially the potential and ultimate progress of the Association and the specialty toward improved methods of diagnosis and treatment.

For 1957 the scientific sessions of the first day (May 13) are devoted to etiology and are arranged to provide a natural sequence or "flow." Each speaker will discuss a specific phase of causation from the negative as well as from the positive aspects. We believe that this provides a coordination of effort and instruction not possible when unrelated papers are read.

The second day (May 14, morning session) likewise has a natural "flow" devoted to treatment. Each speaker has been asked to discuss principles of treatment measures as related to age groups. There will be table and projection clinics, a round-table luncheon discussion, and reports of research.

An innovation this year will be "conference rooms" on case analysis and treatment planning. This can be very useful to our members, and they are urged to take advantage of it. Members of the Association are invited to prepare a problem case, one which prior to treatment or during treatment has given trouble, for submission to the staff of a conference room for diagnosis, analysis, and advice. Cases should be supported by written history and available diagnostic records. Further information may be obtained from Dr. H. K. Terry, 2742 Biscayne Blvd., Miami, Florida.

A thesis written by a successful candidate to the American Board of Orthodontics (1956) will be read.

There will be an exhibit of case reports by diplomates of the American Board of Orthodontics.

Two panels will complete the scientific program, one relating to personality and psychological problems and the other to the many details of practice management.

The American Board of Orthodontics will present the Ketcham Award.

The detailed schedule follows:

Sunday, May 12

2:00 to 5:00 P.M. Registration (everyone who can possibly do so is urged to register at this time).

Monday, May 13

8:00 A.M. Registration—your officers strongly recommend that you do not wait until the last minute to register—the desk will be open for registration Sunday, May 12.

9:00 to 9:30 A.M. Invocation. Rev. John F. Keller, S.J., Chaplain, Dental School, Loyola University, New Orleans, Louisiana.

Address of Welcome. Hon. deLesseps Morrison, Mayor of New Orleans, Louisiana.

Response. Franklin A. Squires, White Plains, New York, president-elect of the American Association of Orthodontists.

9:30 to 10:00 A.M. President's Address. A. C. Broussard, New Orleans, Louisiana.

10:00 A.M. SCIENTIFIC PROGRAM.

Presiding: George M. Anderson, Baltimore, Maryland, program chairman.

The sessions of the first day are devoted to etiology and are arranged to provide a natural sequence or "flow." Each speaker will discuss a specific phase of causation, from the negative as well as from the positive aspects. In this way, we believe, there is a coordination of effort and instruction not possible when unrelated papers are read. Therefore, we have a basic subject heading or title for the papers for this day, two in the morning and two in the afternoon.

Basic Subject: "Malocclusion Is a Resultant of—"

10:00 A.M. Genetics. Harold J. Noyes, Portland, Oregon.

11:00 A.M. Bone Inequities. Harry Sicher, Chicago, Illinois.

12:30 P.M. Golden Anniversary Luncheon. William B. Stevenson, Sr., Amarillo, Texas, Vice-President, American Association of Orthodontists, presiding.

2:30 P.M. Scientific Program (Cont'd).

Presiding: Frank Bowyer, Knoxville, Tennessee, president, Southern Society of Orthodontists.

2:30 P.M. Intrinsic or Local Factors. Thomas D. Speidel, Minneapolis, Minnesota.

3:30 P.M. Extrinsic or General Factors. T. M. Graber, Chicago, Illinois.

Tuesday, May 14

9:00 A.M. Scientific Program (Cont'd).

Presiding: Tom M. Williams, Dallas, Texas, president, Southwestern Society of Orthodontists.

This morning also is planned to have a natural sequence which is devoted to treatment. Each speaker will discuss a specific age group under a basic subject heading or title of "Aims and Methodology of Corrective Measures According to Age Groups." Webster defines *methodology* as a "branch of logic dealing with principles of procedure whether of theoretic or practical science."

9:00 A.M. The Deciduous Dentition. Edward A. Cheney, Lansing, Michigan.

9:45 A.M. The Mixed Dentition. Faustin N. Weber, Memphis, Tennessee.

10:30 A.M. The Permanent Dentition. Malcolm R. Chipman, Spokane, Washington.

11:30 A.M. Presentation of the Albert H. Ketcham Memorial Award of the American Board of Orthodontics by Ernest L. Johnson, San Francisco, California, president, American Board of Orthodontics. Acceptance by Oren A. Oliver, Nashville, Tennessee.

12:30 P.M. Past-Presidents' Luncheon.

1:30 P.M. Research Program conducted by the Research Committee, Presiding: Alton W. Moore, Chairman, Seattle, Wash.
The Prize-Winning Essay.
Essayists receiving honorable mention.
Research reports, in person and by title.

4:00 P.M. Business Session of the American Association of Orthodontists.

Wednesday, May 15

9:00 to 11:30 A.M. Table and Projection Clinics.
In charge: William S. Brandhorst, St. Louis, Missouri, Program Committee member.

12:00 M. to 2:30 P.M. Round-Table Discussion Luncheon.
In charge: Arnold Stoller, Seattle, Washington, Program Committee member.

2:45 to 4:45 P.M. Conference Rooms. "Case Analysis and Treatment Planning."
In charge: H. K. Terry, Miami, Florida, Program Committee member.
These rooms are an innovation. Their purpose is to provide an opportunity for practitioners with problem cases to have them analyzed and discussed by "diagnosticians and assistants" with the hope that the problem may be relieved or lessened.

Members of the Association are invited to prepare a problem case for submission to one of the conference rooms and they are requested to contact Dr. Terry for advice as to further procedure. Cases should have a written history supported by available diagnostic records.

We believe this to be an outstanding opportunity to receive help with your orthodontic problems. Take advantage of it.

Each conference room will have a "diagnostician" who will have an "assistant." They are:

Diagnostician	*Assisting*
1. Philip Adams	William H. Oliver
2. Spencer Atkinson	Ted Gettinger
3. J. Lyndon Carman	Hubert J. Bell, Jr.
4. Edward Cheney	Harlow Shehan
5. Malcolm R. Chipman	Alton W. Moore
6. G. Vernon Fisk	Ross O. Fisk
7. T. M. Graber	Glenn Jackson
8. Andrew Jackson	John Jackson
9. Herbert I. Margolis	Eugene Nelson
10. Oren Oliver	Boyd Tarpley
11. Paul Reid	J. Henry O'Hern, Jr.
12. J. A. Salzmann	Meyer Eggnatz
13. Robert Strang	Will Thompson
14. Raymond Webster	Donald Osborn
15. Albert Westfall	Marcus Murphy

Thursday, May 16

9:00 A.M. Scientific Program (Cont'd).
Presiding: W. Paul Hoffman, Washington, D. C., Program Committee member.
"Some Illusory Phenomena of Importance in Orthodontics." (An original thesis presented to the American Board of Orthodontics toward certification.) Donald MacEwan, Seattle, Washington.

9:45 A.M. Panel.*
Subject: Parent and Patient Personality and Psychological Problems.
Moderator: William S. Smith, San Francisco, California.
Panelists: M. Duke Edwards, Montgomery, Alabama.
T. M. Graber, Chicago, Illinois.
Kyrle W. Preis, Baltimore, Maryland.
Phillip W. Starr, Omaha, Nebraska, will open the discussion with a brief generalized statement.

11:00 A.M. Panel.*
Subject: Office Procedures, Business Management, Office Location, Associations, and Partnerships.
Moderator: Brooks Bell, Dallas, Texas.
Panelists: Stephen C. Hopkins, Sr., Washington, D. C.
V. Everett Hunt, Eureka, California.
Cecil Muller, Omaha, Nebraska.
Alexander Sved, New York City.

12:30 P.M. Business Session of the American Association of Orthodontists. Adjournment.

American Association of Orthodontists Conference Rooms

Conference rooms for case analysis and treatment planning will form a part of the 1957 New Orleans program. They will be scheduled for Wednesday afternoon, May 15.

Each member of the Association is invited to bring a problem case with history, photographs, casts, radiographs, cephalographs, or other data the member considers necessary. This he will turn over to an "assistant" to the "diagnostician," who will present the material for discussion for the benefit of the orthodontists in attendance. Questions and answers should help clarify the problems.

While this is an innovation, the Program Committee believes that these conference rooms offer a real opportunity for cooperation and participation by members who have had difficult problems and have needed qualified help in solving them.

This is your invitation to participate, but you must advise the Program Committee (Dr. H. K. Terry, 2742 Biscayne Blvd., Miami, Florida) at least by April 12, 1957, that you wish a case analysis, so that proper scheduling of the conference rooms may be made.

American Association of Orthodontists Program Committee

The Program Committee for the New Orleans meeting feels that some of the gap can be bridged between training with empirical diagnosis and experience with intangible factor diagnosis. It may be accomplished by getting the experienced diagnostician to relay his thinking as he diagnoses, analyses, evaluates, and plans treatment for a specific case.

When the diagnostician presents a case that he has already gone over and even treated successfully, these thought ramifications are not likely to come out in the presentation of that (his own) case.

We feel, therefore, that if a member brings a case with a history, photographs, casts, radiographs, etc., as he would routinely have in his office (or as he would prepare it for the American Board) and this case is presented to the diagnostician by an "assistant" or "supervisor," the thinking of the diagnostician would be of value to all those present. The case should be a problem case, not yet treated or in the process of being treated. The

*You are invited to mail to the moderators prior to the meeting any questions in which you may have a special interest.

member gives the case material to the assistant who presents it to the diagnostician and those present. The assistant and the diagnostician discuss points that bring out the thinking process that goes into the analysis and treatment planning.

The only problem is that the patient himself should be present, but all of us understand this and must properly weigh it in the balance with any diagnosis given.

Those wishing to present a case to a diagnostician must let the Committee know at least one month prior to the meeting. The actual material need not be sent; just a letter requesting the review of your case by one of the diagnosticians will suffice.

Rules Covering Visitors to the 1957 Meeting of the American Association of Orthodontists, May 13 Through May 16, Roosevelt Hotel, New Orleans, La.

To insure full participation of all members, it is necessary to limit attendance to fully privileged members of the American Association of Orthodontists and the following:

A. *No Attendance Fee*

1. Full-time teachers in university dental schools.
2. Full-time graduate or postgraduate students in university orthodontic departments.
3. Dentists from outside Canada or the United States of America who are members of recognized dental or orthodontic organizations.

B. *Attendance Fee $10.00*

1. Associate or junior members of constituent societies of the American Association of Orthodontists.
2. Recent graduates of university orthodontic departments who are in service.

C. *Attendance Fee $20.00*

1. Recent graduates of university orthodontic departments who are not members of constituent societies of the American Association of Orthodontists.
2. Other guests certified by the Credentials Committee.
   To qualify under this heading you must:
   (a) Be endorsed by two active members of the American Association of Orthodontists in your vicinity.
   (b) Be a member in good standing of the American Dental Association.
   (c) Not have been rejected for membership in any of the constituent societies.

Those desiring to attend the meeting who qualify under the categories listed above should contact the chairman of the Credentials Committee for approval of their credentials.

Credentials Committee,
M. D. EDWARDS
MARION A. FLESHER
FREDRICK B. LEHMAN, Chairman
1107 Merchants National Bank Bldg.
Cedar Rapids, Iowa.

1957 Prize Essay Contest, American Association of Orthodontists

Eligibility.—Any member of the American Association of Orthodontists and any person affiliated with a recognized institution in the field of dentistry or associated with it as a teacher, researcher, undergraduate, or graduate student shall be eligible to enter the competition.

Character of Essay.—Each essay submitted must represent an original investigation and contain some new significant material of value to the art and science of orthodontics.

Prize.—A cash prize of $500.00 is offered for the essay judged to be the winner. The committee, however, reserves the right to omit the award if, in its judgment, none of the entries is considered to be worthy. Honorable mention will be awarded to those authors taking second and third places. The first three papers will become the property of the American Association of Orthodontists and will be published. All other essays will be returned.

Specifications.—All essays must be in English, typewritten on 8½ by 11 inch white paper, double spaced with at least 1 inch margins. Each sheet must be numbered and bound or assembled with paper fasteners in a "brief cover" for easy handling. The title of the essay should appear on the "brief cover." Three complete copies of each essay, including all illustrations, tables, and bibliography, must be submitted. The name and address of the author must not appear in the essay. For purpose of identification, the title of the essay, the author's name, together with a brief biographical sketch which sets forth his or her dental and/or orthodontic training, present activity, and status (practitioner, teacher, student, research worker, etc.) should be typed on a separate sheet of paper and enclosed in a plain sealed envelope. The envelope should carry the title of the essay.

Presentation.—The author of the winning essay will be invited to present it at the meeting of the American Association of Orthodontists to be held in New Orleans, Louisiana, May 13 through 16, 1957.

Judges.—The entries will be judged by the Research Committee of the American Association of Orthodontists.

Final Submission Date.—No essay will be considered for this competition unless received in triplicate on or before Jan. 10, 1957, by Dr. J. William Adams, Indiana University, School of Dentistry, Indianapolis, Indiana.

Alton W. Moore, Chairman, Research Committee
American Association of Orthodontists
University of Washington
School of Dentistry
Seattle 5, Washington

American Association of Orthodontists, 1957 Research Section Meeting

Continuing the policy of recent years, the program will consist of a series of ten minute research reports which may be presented orally or read by title only. All persons engaged in research are urged to participate in this program, which will be held May 13 through 16, 1957, in New Orleans, Louisiana.

Each participant is asked to prepare a 250-word abstract for publication in the AMERICAN JOURNAL OF ORTHODONTICS. Abstract for publication and the ten-minute oral presentation at the meeting should be carefully prepared to present an adequate description of the import of your investigation.

Forms for use in submitting the title and 250-word abstract of your research will be sent to each dental school orthodontic department and to any individual requesting one. Please send your title and abstract as early as possible, but not later than Jan. 10, 1957, to Dr. William B. Downs, Graham Building, Aurora, Illinois.

Alton W. Moore, Chairman, Research Committee
American Association of Orthodontists
University of Washington
School of Dentistry
Seattle 5, Washington

American Board of Orthodontics

The next meeting of the American Board of Orthodontics will be held at the Roosevelt Hotel in New Orleans, Louisiana, May 7 through 11, 1957. Orthodontists who desire to be certified by the Board may obtain application blanks from the secretary, Dr. Wendell L. Wylie, University of California, School of Dentistry, San Francisco 22, California.

Applications for acceptance at the New Orleans meeting, leading to stipulation of examination requirement for the following year, must be filed before March 1, 1957. To be eligible, an applicant must have been an active member of the American Association of Orthodontists for at least two years.

American Association of Orthodontists Hotel Accommodations for 1957 Annual Meeting

Hotel accommodations for the 1957 meeting of the American Association of Orthodontists to be held May 12 through May 16, 1957, in New Orleans, Louisiana, will be made through the office of Dr. B. G. Frick, Jr., 1231 Maison Blanche Bldg., New Orleans 16, Louisiana.

All reservations of rooms will be made in the order in which the requests are received. It is recommended that you send in your applications as soon as possible, as requests must be received before April 27.

Our allotment of rooms is at the following hotels, all within a radius of three and one-half blocks from the headquarters hotel, the Roosevelt.

Approximate Range of Room Rates

Hotel	*Twin*	*Double*	*Single*	*Suites*
Roosevelt (headquarters hotel)	$14—15—18	$11—12	$8—9	$30 up
St. Charles	$13—14—15—16	$ 9—10—11	$6—7—8—9	
Jung	$11—12—14—15	$10—12—13—15	$7—8—9	
Monteleone	$12—13—14—15	$ 9—10—11	$6—7—8—9	
New Orleans	$11—12	$ 8— 9	$6—7	
De Soto	$10	$ 7— 8	$5.50—6	

Please indicate your first, second, and third choice of hotels and date of arrival.

Dr. B. G. Frick, Jr.
1231 Maison Blanche Bldg.
New Orleans 16, La.

Name: ----------

Address: ----------

Please make the following reservation for me to attend the A. A. O. convention in New Orleans, beginning May 12, at the following hotel:

Choice of Hotel	Type of Room and Approximate Rate
1 ----------	----------
2 ----------	
3 ----------	

Date of arrival ----------

Northeastern Society of Orthodontists

The next meeting of the Northeastern Society of Orthodontists will be held March 4 and 5, 1957, at the Hotel Commodore, New York, New York. Vice-President Walter Bedell will preside over the meeting.

General Epperly to Speak to International Dental Congress

Major General James M. Epperly, Chief of the Army Dental Corps, has accepted an invitation to participate in the program of the twelfth International Dental Congress to be held in Rome, Italy, by the Fédération Dentaire Internationale, Sept. 7-14, 1957. He is a member of the Fédération Dentaire Internationale, which conducts the congress every five years with an estimated representation of 230,000 dentists practicing in forty-two nations.

The United States Army will also be represented at the sessions by Colonel H. Beecher Dierdorff, DC, presently the Dental Surgeon for the U. S. Forces in Europe. Colonel Dierdorff is planning an exhibit portraying Army dental advances for display at the congress.

French Society of Dentofacial Orthopedics

The thirtieth meeting of the French Society of Dentofacial Orthopedics will be held in Paris, France, May 30 to June 2, 1957. Members of the American Association of Orthodontists who are going to visit France next spring are cordially invited to attend this meeting.

For further information, write Madame L. Muller, President, 31 Rue de Moscou, Paris 8e, France.

University of Alabama

The University of Alabama School of Dentistry announces a course in removable orthodontic appliance construction. This three-day course will be given Feb. 23, 24, and 25, 1957, under the direction of Samuel D. Gore, D.D.S., of New Orleans, Louisiana.

Columbia University

Columbia University School of Dental and Oral Surgery announces a course in the management of temporomandibular joint disorders, which will be given by Professor Laszlo Schwartz on May 1, 2, and 3, 1957.

Washington University

A postoperative course in the labiolingual technique for orthodontists will be held at Washington University School of Dentistry, St. Louis, Missouri, March 10 to 16, 1957. The course will be under the direction of Oren A. Oliver, assisted by Boyd W. Tarpley, Harold K. Terry, and William H. Oliver.

Admission is limited to persons in the exclusive practice or teaching of orthodontics, whose experience and background qualify them for the course.

Northwestern University

A postgraduate course in cephalometric radiography will be held at Northwestern University School of Dentistry, June 10, 11, and 12, 1957. The course will be under the direction of John R. Thompson, assisted by T. M. Graber, R. W. Donovan, F. S. Ryan, and W. B. Downs.

University of Pittsburgh

The Graduate School of the University of Pittsburgh announces that it is now accepting applications for graduate study in orthodontics beginning with the school registration of 1957. Selections will be made from the applications received in March, 1957.

University of North Carolina

The University of North Carolina, School of Dentistry, announces a two-day course in cephalometrics to be given March 11 and 12, 1957, by Drs. L. B. Higley and R. M. Nelson and staff and a course in occlusal equilibration to be given March 13, 1957, by Dr. J. Wilfred Gallagher and staff.

Eastman Dental Dispensary

A two-year course in orthodontics under the direction of Dr. J. D. Subtelny is being offered by the Eastman Dental Dispensary in Rochester, New York. Arrangements permit the earning of a Master of Science degree by those enrolling for supplementary courses at the University of Rochester, School of Medicine and Dentistry.

Notes of Interest

Dr. Hubert J. Bell, Jr., announces the removal of his office from 116-117 Physicians Bldg. to 230 Mercantile Bank Bldg., 13th and Walnut, Boulder, Colorado, practice limited to orthodontics.

William S. Brandhorst, D.D.S., announces the removal of his office to 9827 Clayton Rd., Ladue, Missouri, practice limited to orthodontics.

J. Francis Burke, D.D.S., announces the opening of his office for the practice of orthodontics at 8515 Germantown Ave., Chestnut Hill, Philadelphia, Pennsylvania.

Dr. William Kress announces his return from Military Service and the opening of his office at 601 Medical Arts Bldg., Baltimore, Maryland, practice limited to orthodontics.

Albert H. Weisenfeld, D.D.S., announces the removal of his office to 1019 Pulaski Rd., East Northport, New York, practice limited to orthodontics.

OFFFICERS OF ORTHODONTIC SOCIETIES

The AMERICAN JOURNAL OF ORTHODONTICS is the official publication of the American Association of Orthodontists and the following component societies. The editorial board of the AMERICAN JOURNAL OF ORTHODONTICS is composed of a representative of each one of the component societies of the American Association of Orthodontists.

American Association of Orthodontists

President, A. C. Broussard - - - - - - - - - Maison Blanche Bldg., New Orleans, La.
President-Elect, Franklin A. Squires - - - - - - - Medical Centre, White Plains, N. Y.
Vice-President, William B. Stevenson - - - - - - - 610 West 8th St., Amarillo, Texas
Secretary-Treasurer, Earl E. Shepard - - - - - - - - - 8230 Forsyth, St. Louis, Mo.

Central Section of the American Association of Orthodontists

President, Thomas D. Speidel - - - - - - - - University of Minnesota Dental School, Minneapolis, Minn.
Secretary-Treasurer, William F. Ford - - - - - - - - 575 Lincoln Ave., Winnetka, Ill.

Great Lakes Society of Orthodontists

President, Harlow L. Shehan - - - - - - 601 Jackson City Bank Bldg., Jackson, Mich.
Treasurer, Russell E. Huber - - - - - - - 350 Fidelity Medical Bldg., Dayton, Ohio
Secretary, D. C. Miller - - - - - - - - - - 40 South Third St., Columbus, Ohio

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President, Aubrey P. Sager - - - - - - - 1210 Medical Arts Bldg., Philadelphia, Pa.
Secretary-Treasurer, Paul A. Deems - - - - - - - - 835 Park Ave., Baltimore, Md.

Northeastern Society of Orthodontists

President, Oscar Jacobson* - - - - - - - - - 35 W. 81st St., New York, N. Y.
Secretary-Treasurer, Wilbur J. Prezzano - - - - - Medical Centre, White Plains, N. Y.

Pacific Coast Society of Orthodontists

President, A. Frank Heimlich - - - - - - - - 1824 State St., Santa Barbara, Calif.
Secretary-Treasurer, Raymond M. Curtner - - - - 450 Sutter St., San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, J. Lyndon Carman - - - - - - - - - 501 Republic Bldg., Denver, Colo.
Secretary-Treasurer, H. Carlyle Pollock, Jr. - - - - - 1558 Humboldt St., Denver, Colo.

Southern Society of Orthodontists

President, Frank P. Bowyer - - - - - - - - 608 Medical Arts Bldg., Knoxville, Tenn.
Secretary-Treasurer, H. K. Terry - - - - - - - - 2742 Biscayne Blvd., Miami, Fla.

Southwestern Society of Orthodontists

President, Tom M. Williams - - - - - - - 612 Medical Arts Bldg., Dallas, Texas
Secretary-Treasurer, Harold S. Born - - - - - - 908 S. Johnstone, Bartlesville, Okla.

American Board of Orthodontics

President, Ernest L. Johnson - - - - - - - - - 450 Sutter St., San Francisco, Calif.
Vice-President, Lowrie J. Porter - - - - - - - - 41 East 57th St., New York, N. Y.
Secretary, Wendell L. Wylie - - - - - - University of California School of Dentistry, The Medical Center, San Francisco, Calif.
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Director, William R. Humphrey - - - - - - - - - Republic Bldg., Denver, Colo.
Director, L. Bodine Higley - - - - - - University of North Carolina, Chapel Hill, N. C.
Director, B. F. Dewel - - - - - - - - - - - - - 708 Church St., Evanston, Ill.

Forthcoming meetings of the American Association of Orthodontists:
1957—Roosevelt Hotel, New Orleans, Louisiana, May 12 to 16.
1958—Commodore Hotel, New York, New York, April 27 to May 1.
1959—Statler Hotel, Detroit, Michigan, May 4 to 7.

*Deceased.

There is an apparent discrepancy

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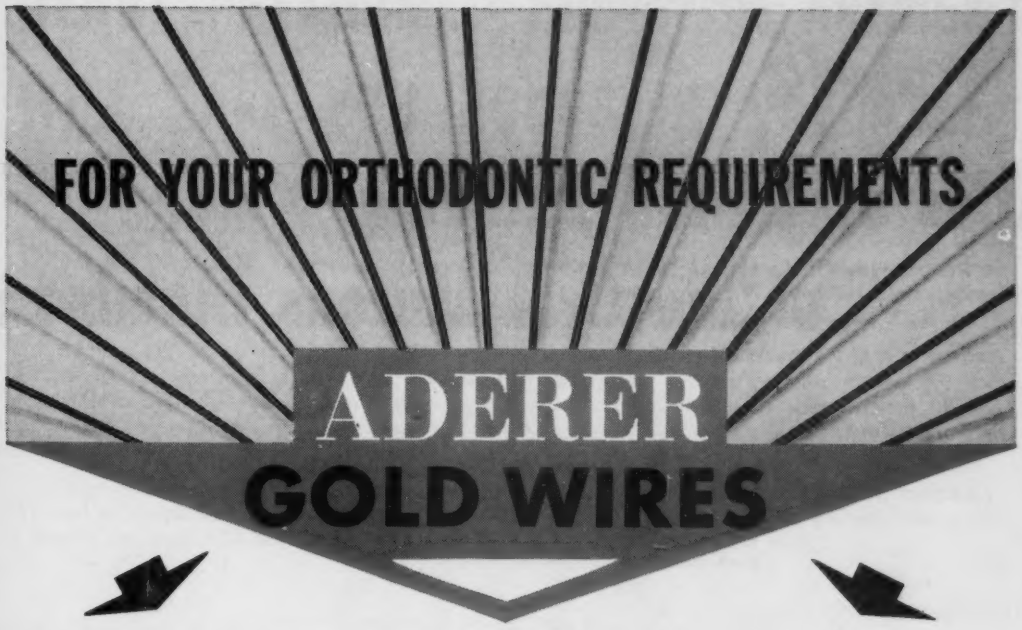

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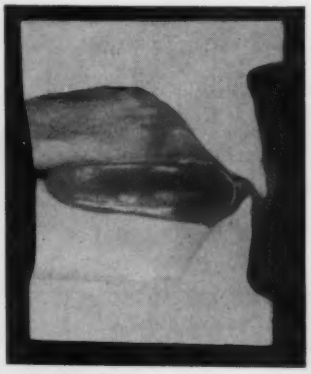

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Practice Administration for THE DENTIST

Edited by **WILLIAM R. MANN, M.S., D.D.S.**, Ann Arbor, Michigan. Associate Professor of Dentistry, School of Dentistry, and Associate Director, W. K. Kellogg Foundation Institute; Graduate and Postgraduate Dentistry, University of Michigan.

and **KENNETH A. EASLICK, A.M., D.D.S.**, Ann Arbor, Michigan. Professor of Dentistry, School of Dentistry, University of Michigan.

386 pages.

This volume provides a summary of the fundamentals necessary for the efficient, ethical practice of dentistry, for professional improvement, and for participation in community life—a long uncharted area of professional concern. It is the outgrowth of the workshop held at the University of Michigan. Those who attended represented 31 states, the District of Columbia, and four provinces of Canada. Instructors from 26 dental schools were in attendance.

At this workshop dentists, dental hygienists, dental assistants, dental teachers, and others interested in the subject critically presented the data, information, and opinions available regarding the entire area of practice administration and determined the best patterns for the dentist to adopt in organizing and administering his practice and for filling his niche of professional responsibility in his community.

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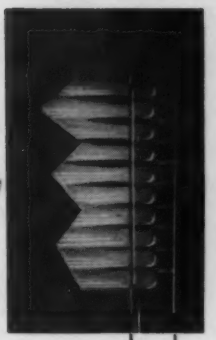

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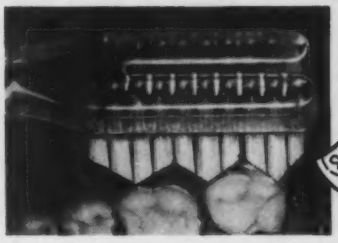

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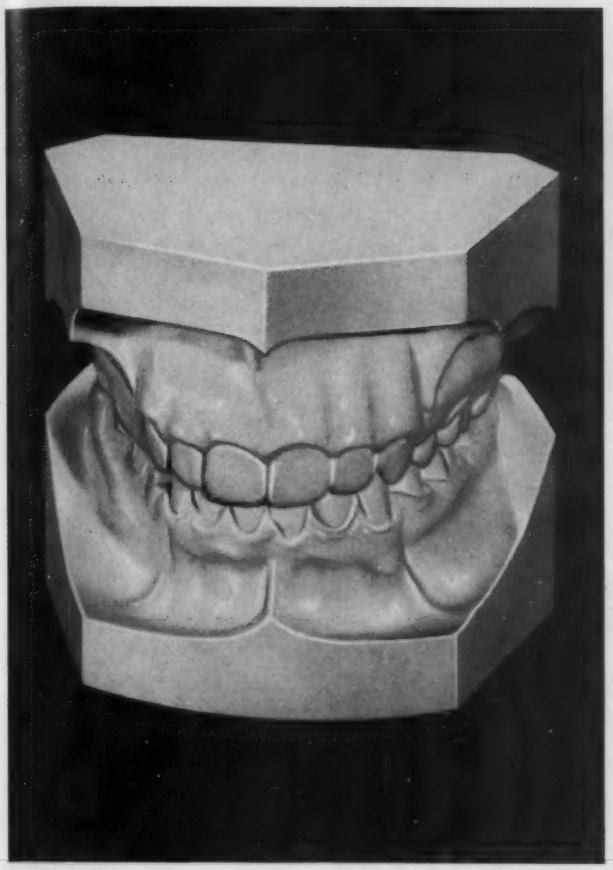

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